TOWNSHIP OF LONG HILL
SANITARY UTILITY SYSTEM
ASSET EVALUATION & CAPITAL IMPROVEMENT PLAN

January 2017

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Executive Summary

In late 2016, the Township authorized Remington & Vernick Engineers to tour their existing sanitary facilities, review current records, and interview utility personnel to prepare an evaluation of the existing sanitary facilities. Included in the evaluation of the system was an analysis of both above ground and below ground infrastructure.

The Long Hill Township Sanitary Utility owns and operates eight (8) sanitary pump stations and their own Wastewater Treatment Plant (WWTP). The WWTP is permitted with the NJDEP to treat and discharge flows at a listed capacity of 0.9 MGD. As early as 2005, the Township was exceeding their listed permit flow of 0.9 MGD. However, flow is *not* a permitted *limit* under the plant's NJPDES permit. Since the WWTP has been performing and has not been exceeding the effluent permit limits at flows greater than 0.9 MGD, the Township has been functioning without modifications. However, the Township has a large amount of Inflow and Infiltration (I&I) entering the system. The flow fluctuations between dry and wet weather events is difficult for the plant to handle. Also, additional connections in conjunction with the I&I flow does / will exceed the hydraulic capacity of the plant. Therefore, the Township placed a voluntary Sewer Connection Ban on the sanitary system in September 2001 and has a committee to review each requested connection on a case by case basis.

However, the ability to allow development and redevelopment opportunities in the Township is unavailable or limited. Therefore, the Township has completed two (2) separate studies to establish various scenarios to either 1) reduce I&I in the sanitary system and therefore "free" up treatment capacity at the plant and/or 2) make improvements to the plant that will increase the hydraulic capacity and allow additional flow to be accepted and treated.

While this study does discuss the results of the previous studies completed by the Township, the intent of this study is not to duplicate the efforts of previous work and does *not* provide the Township with options for addressing Capacity Assurance and allowing additional connections to the system. Instead, this study has examined the existing sanitary system from an operational and maintenance perspective and provides recommended improvements necessary for the long term sustainability of the system. This report provides annual proposed improvements and their associated costs over a 20-Year Planning Period. This document can serve as a planning tool to allow the governing body to budget for the annual maintenance the system. However, this document may provide, a sometimes sobering, realization of the overall costs necessary to sustain the system at its *current*

capacity. This document does not include improvements to the system which have been discussed in previous studies. Therefore, this document will allow the governing body to determine if the continued ownership is something which is fiscally achievable by the Township over the long term. Should the governing body determine that sustainable maintenance of the system would create an undue burden on the Township residents, then this report may be used as part of the utility RFP process.

As is detailed in this report, there is a lot of infrastructure (both above grade and below grade) that must be maintained by the utility. Much of the infrastructure dates back to pre-1930; making much of the infrastructure older than 90 years and approaching the end of its useful life.

Many of the improvements detailed in this report address maintenance and the necessary routine replacement to mechanical elements in the system. Based upon our review of the existing system, it is our opinion that the existing above ground infrastructure is well maintained by the utility personnel. However, the Township has made many costly improvements/expansions to the treatment plant over the years which may have limited funds necessary to make the necessary routine improvements to the remainder of the system. Accordingly, there are improvements that are necessary in the system that are outlined in the 20-Year Capital Improvement Plan.

In addition, the Township began lining prioritized portions of the sanitary system in an effort to eliminate I&I. However, that work has ceased while the governing body establishes the best course of action for the Township (i.e. reduce I&I vs. expand WWTP vs. sell the system).

However, it is our opinion that lining portions of the sanitary system does not merely reduce I&I. Lining the sanitary main provides additional lifespan to the pipe. Particularly with older pipe that is aging and will require replacement.

As will be noted, much of this report involves the discussion of the older, below grade sanitary conveyance system. Specifically, what is the appropriate time to replace this infrastructure in order to be proactive rather than reactive yet still not replace the infrastructure prematurely? A balance must be incorporated so as not to create an undo financial burden to the customer yet still be protective to the utility infrastructure.

It was this platform that predicated the development of the sanitary conveyance replacement plan over the next 20 years. As is demonstrated in this report, the planned lining / replacement of the sanitary conveyance system is *very conservative*. This conservative approach was selected to

allow the Township to budget for biased routine lining / replacements while not replacing the infrastructure prematurely. As is shown in the plan, the sanitary conveyance system replacement plan incorporates below grade utility replacements but is conservative such that after replacements, approximately **50% of the below grade infrastructure will be older than 105 years old at the end of the 20 year planning period**. As is clear in the report, the Township has the ability to examine the 20 year plan on an annual basis and budget to make additional improvements, as required, to modernize the utility infrastructure.

In addition, the above grade infrastructure associated with sanitary pump stations, and wastewater treatment processes are incorporated into the 20 year Capital Improvement Plan for a comprehensive review and budgetary planning tool for the utility.

Based upon this analysis approach, it is estimated that annual Utility fees over the next 20 years will consist of, on average, the following:

Annual Pump Station/WWTP Improvement Costs =	$547,500
Annual Sanitary Conveyance System Improvement Costs =	$813,000
Estimated Average *Annual* Sanitary Utility Improvement Budget =	$1,412,400**

** Annual average costs do not include:

- The estimated $3.5-$4 million to expand infrastructure to septic areas;
- The annual Sanitary Operating Budget and Debt Service.

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Asset Evaluation & Capital Improvement Plan

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Section I

Introduction

The Township of Long Hill (Township) is located in Morris County, New Jersey and has approximately 8,702 residents based upon the 2010 census. The Township owns and operates their sanitary system which consists of the following:

- Eight (8) sanitary pump stations;
- One (1) WWTP with rated capacity of 0.9 MGD;
- Estimated 286,290 linear feet of sanitary sewers;
- Estimated 1,260 sanitary manholes;
- Estimated 15,200 linear feet of force mains;
- Estimated 221,325 linear feet of privately owned service lateral.

In late 2016, the Township authorized Remington & Vernick Engineers to tour their existing utility facilities, review current records, and interview utility personnel to prepare an evaluation of the existing utility facilities. Included in the evaluation of the system was an analysis of both above ground and below ground infrastructure. In particular, the condition of existing infrastructure based upon known age, recent improvements/upgrades, repair /emergency response records and operational / maintenance records were utilized to evaluate the system.

The intent of the evaluation is to provide a summary of the Township of Long Hill major utility facilities and present findings and potential improvements regarding the physical condition, operation and maintenance of these facilities.

As noted in specific sections of this report, many of the existing facilities are aged, some having been constructed in the early 1930's and 1940's. A number of the recommendations presented herein relate to the age of existing facilities. This report may serve as a preliminary basis for establishing the utility infrastructure improvements which may need to be completed and will assist the Township in developing a long term capital utility improvements plan. Since estimated costs are provided for all outlined improvements, the Township may use this report for preliminary budgeting and as a basis for rate review discussions.

It should be noted that although the utility infrastructure is older in nature, the utility personnel have done well in maintaining the infrastructure in a clean and orderly manner; within the limits of their annual budget. However, sufficient funds are not allocated to allow for the necessary routine maintenance and sustainable operation of the system.

Section 2 Wastewater Collection & Pumping System

The existing wastewater collection and pumping system consists of wastewater pump stations, force mains, collector sewers, and a 0.9 MGD permitted Wastewater Treatment Plan. Many of the wastewater system facilities are old, having been constructed in the early 1930's around the time of the original wastewater treatment plant.

This section summarizes the wastewater pumping and collection system, including recent improvements and scheduled work. Recommendations for facility improvements focus on physical conditions, site conditions, and equipment operation and maintenance.

2.1 Valley Road Pump Station

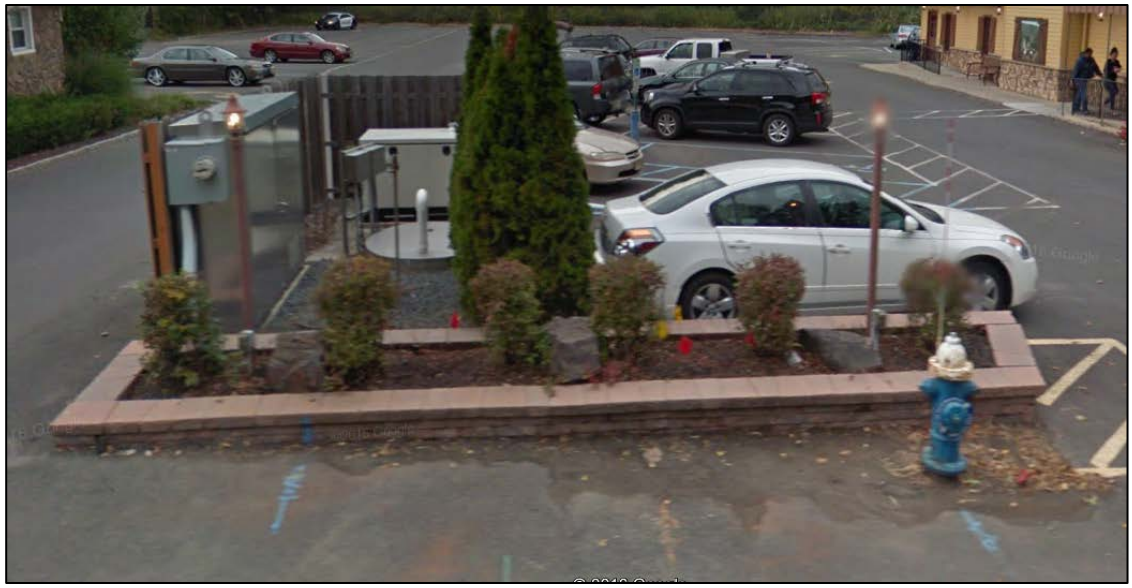

Photo #1 – Pump Station from Valley Road

2.1.1 General Site Description

The Valley Road Pump Station is located along State Route 512 also known as Valley Road. The pump station is located along the south east portion of the Township; adjacent to Berkley Heights Township.

The site is small and is located in a parking lot between two (2) commercial buildings; the Chimney Rock Inn and an office building. Access to the parking lot is thru a single entrance and exit driveway. Two (2) parking spaces are located directly adjacent to the entrance to the station however, utility personnel have

stated that access to the station is not an issue.

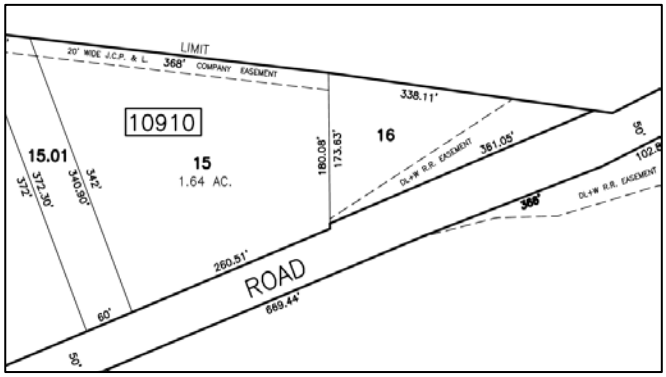

Photo #2 – Tax Map of Site – B 10910 L 15


Photo #3 – View from parking lot; no fence

The station appears to be located on Block 10910 Lot 15 which a 1.64 acre parcel and is the common lot to the Chimney Rock Inn and office building. Based upon the current tax map shown in Photo #2, there is no easement for the existing station. Accordingly, it is recommended that the Township confirm ownership of the land and obtain an easement, as necessary, for the pump station.

The station is surrounding on two (2) sides by a wooden stockade fence. However, the fence does not fully surround the site. Instead, landscaping surrounds the station on the sides without a security fence. While the structures of the station are locked, they are still accessible to the public. Consideration should be given to installing a security fence around the entire pump station site.

The structures of the site are surrounded by stone which is not noted to be a maintenance issue by utility personnel.

The station receives flows from the adjacent Chimney Rock Inn and office building as well as two (2) residential homes. A 4" force main exists the station to the west thru the exit driveway and runs approximately 650 feet to the intersection with Norwood Drive where it discharges to the gravity main. There are no reported issues with odor associated with the station or force main.

2.1.2 Structural / Station Description

Photo #4 – View of station from Valley Road

The pump station is a duplex submersible station and consists of a below grade wet well and valve vault. Upgrades were made to the station in 2010 which consisted of a new natural gas generator, electrical panel and Mission Control Alarm System. The station has some grease issues due to its proximity to the restaurant. Utility personnel handle the grease issue by cleaning the wet well every 4 months. At the time of inspection, the utility personnel were not aware when the station was originally constructed. However, based upon historic aerials, the station was constructed prior to 1989.

The two (2) pumps are 7.5 HP Flygt Pumps that have not be replaced within, a minimum, the last 10 years. As a general rule of thumb, pumps typically require replacement approximately every 10 years. The condition of the pumps and their associated operation can be examined during the projected 10 year life cycle for scheduled replacement. However, for budgeting / planning purposes, pump replacements are planned on a 10 year cycle in the 20-Year Capital Improvement Plan. In addition, the vault valves should be replaced at the same time as the pumps. While the replacement of the valves is not the same frequency as the pumps, the Township should plan for replacement of the valves once over the 20-Year planning cycle.

Since the station is submersible in nature, there are no above grade structures to inspect. The area surrounding the vault / wet well manhole appears to be visually stable and are no currently noted structural defects.

2.1.3 *Mechanical / Plumbing*

Photo #5 – Natural Gas emergency generator

Photo #6 – Natural Gas piping/regulator

As noted, both pumps are 7.5 HP Flygt pumps that should be scheduled for replacement. In 2010, a new Cummins natural gas generator was also installed. The Township Utility personnel do inspection / testing of the generators every 250 hours. In addition, once per year, the Township has an outside contractor inspect and test the fluids of all generators with recommendations for upgrades / maintenance.

The Township should be aware that Federal guidelines establish the useful lifespan of a generator as 20-25 years. This guideline is to ensure operation of the equipment during emergency events. While we do not recommend replacement of equipment that is maintained and operating at its original design capacity, it is important for the Township to be aware of the accepted / standard lifespans of equipment. This will allow for budgetary planning and proper inspection of equipment as the equipment approaches its useful life.

There is a yard hydrant on site which supplies potable water for wash downs. While there is a below grade meter, there is no back flow preventer. The backflow preventer is required and has been incorporated into the 20-Year Capital Improvement Plan.

The station does not have a grinder. Based upon information provided by the Utility personnel, it does not appear that this is currently an issue. Should this become an issue in the future, the Township should consider installing a grinder in the wet well. Since there does not appear to be a current need, a grinder has *not* been included in the 20-Year Capital Improvement Plan.

2.1.4 *Electrical & Controls*

Photo #7 –Electrical panel with yard hydrant in foreground

Photo #8 –Automatic transfer & Mission Controls

Incoming service is 120/240 volt three phase. The service comes from Valley Road and the electrical meter is installed adjacent to the electrical pane. The main service panel provides 100 amp which appears sufficient for the station.

The pumps operate off floats / transducers which are cleaned off by the utility personnel 3 times per week.

In 2010, a Mission Control cellular alarm system was installed. The system is dial up only and does not control the pumps.

2.1.5 *Long Term Capital Improvement Plan*

The following work should be considered for the long term maintenance and operation of the system:

- Review tax map and possible land ownership issues. Obtain easement;
- Security fence around entire pump station;
- Replace two (2) 7.5 HP submersible pumps (twice over the 20 year planning period);
- Replace two (2) check and gate valves in valve vault;
- Replace flow meter (two times over planning period);
- Yard Hydrant Backflow Preventer;
- Possible replacement of generator.

2.2 Centennial Village / King Drive Pump Station

Photo #9 & #10 –Pump station from access driveway off of Kings Drive

2.2.1 General Site Description

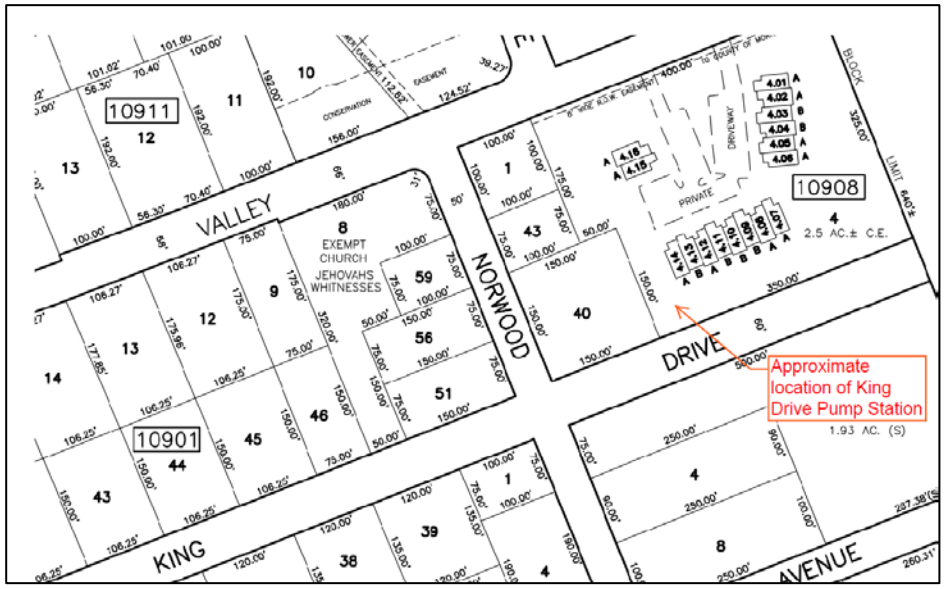

Photo #11 –Location of King Drive Pump Station

The Centennial Village / King Drive Pump Station is located along King Drive; at the rear of the townhouse community. The lift station serves approximately 20 townhomes.

Based upon available tax maps, it does not appear that the Township has a dedicated easement for the pump station. Accordingly, an easement should be obtained for the station.

Access is via a stone road off of Kings Drive. The area is residential and wooded. Sufficient parking around the station is available for maintenance and repair vehicles. This area should be incorporated into the easement. A wooden stockade fence with a locked gate secure the site.

The station is a submersible pump station with separate below grade wet well and valve vault. The areas surrounding the station structures is concrete and stone. At the time of inspection, the station had overgrown vegetation. If not yet addressed, the overgrowth should be removed to prevent further root infiltration.

2.2.2 Structural / Station Description

The pump station is a duplex submersible station and consists of a below grade wet well and valve vault. Upgrades were made to the station in 2010 which consisted of a new natural gas generator, electrical panel and Mission Control System. At the same time, the structure which surrounded the former structure was removed.

The two (2) pumps are 3 HP Flygt Pumps. One (1) of the pumps was replaced after the upgrades in 2010. Accordingly, the replacement of both pumps and vault valves shall be replaced as part of the 20-Year Capital Improvement Plan.

Since the station is submersible in nature, there are no above grade structures to inspect. The area surrounding the vault / wet well manhole appears to be visually stable and are no currently noted structural defects.

The station has a 2" PVC force main which runs to the top of the driveway where it connects to the gravity system.

2.2.3 Mechanical / Plumbing

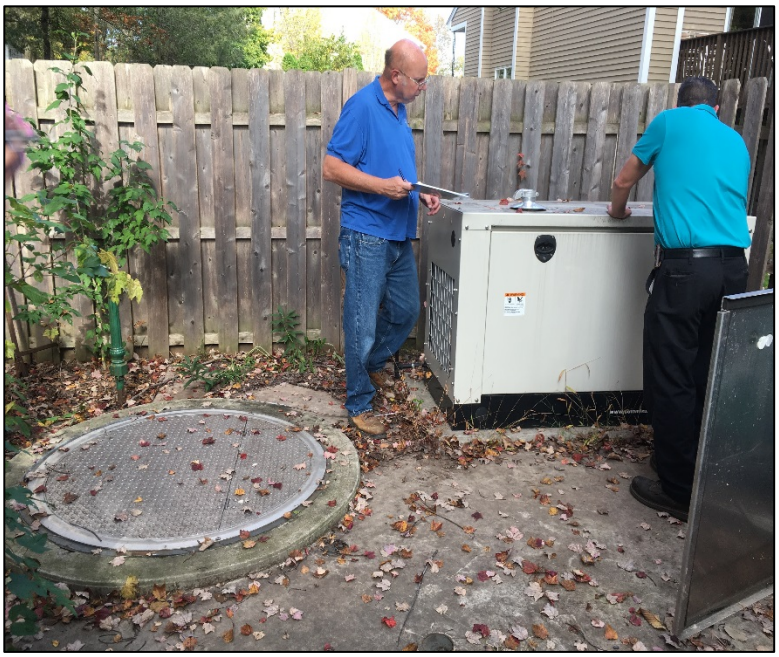

Photo #12 & 13 –Wet Well and Natural Gas Generator

As noted, both pumps are 3 HP Flygt pumps that should be scheduled for replacement. In 2010, a new Cummins 20 KW natural gas generator was also installed.

The yard hydrant which supplies potable water for wash downs is located adjacent to the wet well. There is no back flow preventer which is required by code and has been incorporated into the 20-Year Capital Improvement Plan.

The station does not have a grinder. Based upon information provided by the Utility personnel, it does not appear that this is currently an issue. Should this become an issue in the future, the Township should consider installing a grinder in the wet well. Since there does not appear to be a current need, a grinder has *not* been included in the 20-Year Capital Improvement Plan.

2.2.4 Electrical & Controls

Photo #12 - Natural Gas Generator

Photo #13 – Service panel sitting on the ground.

Incoming service is 120/240 volt single phase. The meter for the service is located on the electrical service panel. The 100 amp service control panel houses the Cummins Automatic Transfer Switch and Mission Control. The service panel is low to the ground. While this is not a code issue, it creates issues for working in the panel. The Township should consider raising the panel as part of the 20-Year Capital Improvement Plan.

2.2.5 Long Term Capital Improvement Plan

The following work should be considered for the long term maintenance and operation of the system:

- Review tax map and possible land ownership issues. Obtain easement;
- Raise electrical panel;
- Replace two (2) 3 HP submersible pumps (twice over the 20 year planning period);
- Replace two (2) check and gate valves in valve vault;
- Yard Hydrant Backflow Preventer;
- Replace flow meter (two times over planning period);

- Vegetation Maintenance;
- Possible replacement of generator.

2.3 Morristown Road Pump Station


Photo #14 & 15 – Pump Station from access drive off of Morristown Road

2.3.1 General Site Description

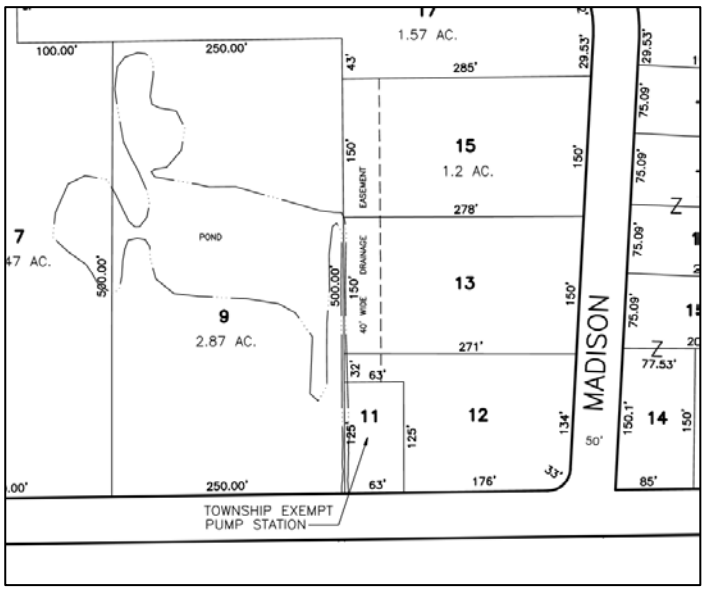

Photo #16 – Station – Block 11203 Lot 11

The Morristown Road Pump Station is located approximately 65 feet off of Morristown Road on the parcel known as Block 11203, Lot 11. Access to the station off of Morristown Road is via an asphalt paved road. The site is secured

by a 6' high chain link fence with barbed wire top rail. The fence has both a swing gate for vehicles and man gate. Once inside the fenced area, the asphalt access drive has a turnaround for maintenance and utility vehicles.

The site is owned by the Township and is noted to be 63' wide by 125' long. At the rear of the property is a creek / pond and drainage easement. In addition, the area is wooded. Some of the trees surrounding the site are infringing into the fenced area. Some damage from falling limbs is apparent on the building. It is recommended that maintenance / removal of trees surrounding the site be completed to prevent future damage.

This site does flood however, it is during high rain events due to I&I and not from regional area flooding.

2.3.2 Structural / Station Description

Photo #17 – Front view of pump station; driveway to the left

Photo #18 – Rear of pump station; diesel tank on elevated pad

Unlike the other two pump stations detailed so far, the Morristown Road pump station is not a submersible pump station. Instead the station consists of a wet well / dry well structure comprised of brick and CMU walls. The walls support a flat asphaltic built up roof with a stone ballast and metal edge capping. The Utility personnel were not aware of the last time the roof was replaced. Accordingly, the Township should plan for one roof replacement over the 20-Year planning period.

The steel lintels at wall penetrations are rusted and should be cleaned and

repainted. In addition, metal capping at the north-west corner of the roof is damaged from falling limbs and needs to be replaced. Minor cracking is evident at the foundation corners and should be patched to prevent moisture infiltration and should be monitored for further damage.

Below grade, a poured concrete structure extends to the level of the wet well. Access to the lower levels is provided by a set of aluminum spiral stairs, which are in fair condition but exhibit some horizontal sway. The supports of the stairs should be examined and replaced/supported.

This station has three (3) pumps as follows:

- Two (2) Gorman Rupp self-priming pumps. The pumps are used as lead / lag during normal operating conditions;
- One (1) dry pit submersible pump. This pump is only used during flood events.

Photo #19 – Piping and valves

Photo #20 – Gorman Rupp pumps

The pump motors have been replaced within the last 10 years. The pumps motors should be planned for one additional replacement during the 20-Year planning period. Based upon information provided by the utility personnel, the check valves in the station have been replaced in the station within the past 10 years. Planning should incorporate the replacement of the gate valves at the same time as the pump/motor replacements.

This station does not have a grinder and would benefit from the installation due to the flow experienced by the system and that the existing pumps clog.

Photo #21 – Wet well hatch

The hatch to the wet well is showing signs of deterioration and should be scheduled for replacement. In addition, stairs and safety grating should be installed in the wet well.

2.3.3 *Mechanical / Plumbing*

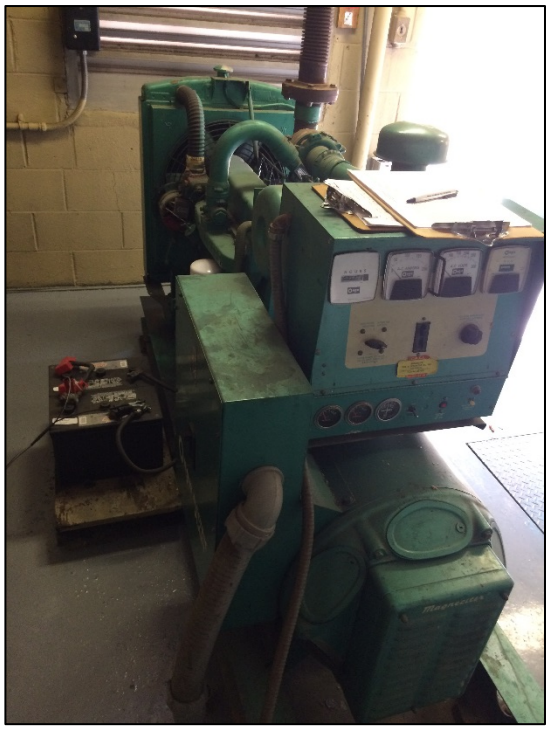

Photo #22 – Diesel emergency generator

Photo #23 – Dry pit submersible pumps

The generator is a 60Kw diesel driven generator. The generator is fed from a 275

gallon above ground double wall tank installed on an elevated pad at the rear of the site. There is a day tank with a supply and return line that provides fuel from the tank to the generator. The Utility personnel believe that the generator is original to the building. Accordingly, for planning purposes, the Township should incorporate a generator replacement for this station during the planning period. At the same time, the generator should be relocated outside.

There is reduced ability for the utility personnel to clean this wet well. Accordingly, it should be planned to by-pass, clean and paint the wet well once during the 20-Year planning cycle.

2.3.4 *Electrical & Controls*

Photo #24 & #25 - Electrical panels

Incoming service is 120/240 volt three phase with a 200 amp main breaker and sub panel. The overhead service comes from Morristown Road with the electrical meter installed on the exterior of the building; adjacent to the front door. Mission Control cellular alarm system is installed at the station and is dial up only.

The station is in need of lighting upgrades as well as ventilation upgrades. These items should be planned within the 20-Year planning period.

2.3.5 *Long Term Capital Improvement Plan*

The following work should be considered for the long term maintenance and operation of the system:

- Maintenance of trees surrounding the site;
- Repair / Replace Spiral Stair Supports;
- Roof replacement;
- Lintel maintenance;
- Minor foundation repairs;
- Replace three (3) pump motors;
- By pass pump, clean & paint wet well;
- Replace three (3) gate valves;
- Grinder Installation;
- Grinder teeth replacement – twice over planning life cycle;
- Wet well hatch, stairs and safety grating;
- Generator and transfer switch replacement and relocation;
- Electrical upgrades;
- Lighting upgrades;
- Ventilation/dehumidifier upgrades;
- Replace flow meter (two times over planning period).

2.4 New Vernon Road Pump Station

Photo #26 – New Vernon Pump Station – view from New Vernon Road

2.4.1 General Site Description

Photo #27 – Aerial of New Vernon Pump Station

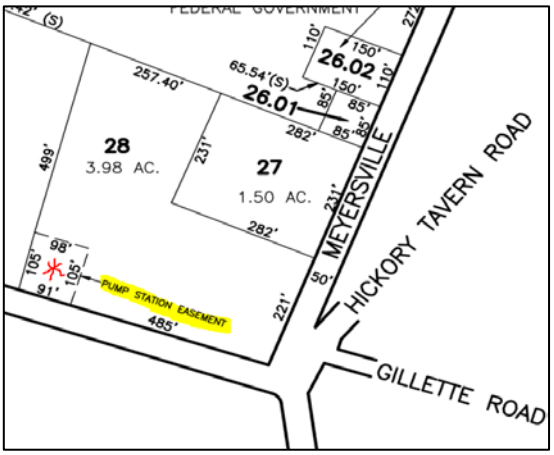

Photo #28 –New Vernon Pump Station Easement

The New Vernon Pump Station is similar to the Morristown Road pump station in terms of construction. This station is located along New Vernon Road and is the Townships most northern station and is across from Meyersville Field.

Access to the station is off of New Vernon Road via an asphalt milling drive way. There appears to be areas of degradation and rutting in the driveway and access shoulder. The driveway will need maintenance and addition of material during the planning period. Accordingly, it is recommended the access driveway and shoulder be paved to reduce further maintenance and repair costs in the future.

There is sufficient room for parking of both utility and maintenance vehicles. The pump station is secured by a 6' high chain link fence with barbed wire top rail. The barbed wire appears to be missing in locations and should be replaced should the Township feel the wire is beneficial. There is a single swing gate into the fenced area.

Based upon recent tax maps, the station is located on Block 14701 Lot 28 and is part of an easement owned by the Township. The easement is approximately 98' wide by 105' deep. Accordingly, there are no ownership issues to resolve for this property should the Township consider a utility sale.

The area surrounding the station is wooded. Similar to the Morristown Road station, maintenance of the adjacent tree line is essential to protect the infrastructure owned by the Township. However, since the Township has an easement on the property and does not own the adjacent parcel lands, it is recommended that the Township establish maintenance responsibilities with the property owner.

The station receives flows from residential and commercial properties, including 3 restaurants. The force main for the station is 6" and discharges at the intersection of New Vernon Road and Meyersville Road; approximately 450 feet south of the station. There are no reported issues with odor from the station or force main.

2.4.2 Structural / Station Description

Photo #29 –Separation around louvers

Photo #30 –Minor floor surface cracking at generator. Fill and monitor.

The structure of this station is similar to the Morristown Road station. The concrete plank flat roof is supported by brick and CMU walls with steel lintels in good condition at the wall penetrations. Utility personnel do not believe that improvements have been completed on the roofing system over its life span. Accordingly, the Township should plan for the replacement of the roofing system during the 20-Year planning period.

Minor slab cracking is evident around the interior generator pad and should be monitored. There is a hoist beam with a 1 ton hoist within the station that is aligned with the access hatches in the floor. The doors and louvers appear to be original to the building and vertical separation is apparent in the sealant between the frame and wall. This separation should be filled, sealed and monitored to prevent water infiltration behind the exterior and degradation of the brick.

General housekeeping upgrades are required for the building. Specifically, the Township should include the replacement of the station doors as part of their planned improvements. The existing doors are showing singes of degradation and should be planned for replacement. In addition, the hatch in the floor to the wet

well does not have a grate. A safety grate should be included in the 20-Year Capital Improvement Plan for worker safety considerations.

The pump station is a duplex pump station with an above grade building and below grade pumps and wet well. As noted previously, the station has some grease issues from the nearby restaurants. The utility handles the grease by pumping and cleaning the wet well every 3-4 months. The frequency of wet well cleanings has not been as consistent due to a reduction in personnel and manpower issues. It is recommended that scheduling modifications be considered to allow the consistent cleaning of the wet wells. In addition, a degreaser may be considered that will assist in the reduction of grease buildup in the wet well.

Both pumps in the station are 75 HP Flygt Pumps that have been replaced in the last five (5) years. As noted previously, pumps typically require replacement approximately every 10 years. The condition of the pumps and their associated operation can be examined during the projected 10 year life cycle for scheduled replacement. However, for budgeting / planning purposes, pump replacements are planned on a 10 year cycle in the 20-Year Capital Improvement Plan. In addition, the pump/piping valves should be replaced at the same time as the pumps.

Photo #31 –Flow Meter Display


Photo #32 –Spiral stairs to lower level

The station uses an electromagnetic flow meter originally installed in 2005 to monitor flows from the station. The meter is old and experiencing issues and should be replaced. The typical lifespan of a magnetic meter is 10-15 years. Accordingly, two meter replacements should be included in the 20 year planning cycle.

The station has the same spiral stairs that provides access to the lower level. It is recommended that the stairs be cleaned and fasteners/supports be upgraded.

The station was originally constructed with a grinder. A new grinder is required and should be installed to prevent clogging of the pumps and surcharging / overflowing of the system.

During the facility tour, it was noted that proper ventilation is not incorporated into the existing wet well. Ventilation is a necessary element to sustain and extend the lifespan of the station equipment. Ventilation is also required for worker safety. Accordingly, station ventilation system improvements have been incorporated into the 20-Year Capital
Improvement Plan.

Photo #33 –View of wet well area requiring safety grating

It was also noted that the wet well access/walkway was deficient of safety grating. The installation of safety grating has been incorporated into the 20-Year Capital Improvement Plan for worker safety considerations.

2.4.3 *Mechanical / Plumbing*

Photo #34 & #35– Diesel emergency generator – inside building with air intake

The generator for the facility is an Onan diesel generator rated at 175 kW. The generator is fed by a 275 gallon above ground storage tank located on the side of the building. Based upon information provided by the utility, recent NJDEP inspections have resulted in the comments that the generator is required to be moved to the exterior of the building. Should these inspection comments hold true, a new diesel generator should be moved to the exterior of the building on a reinforced concrete pad raised above the flood elevation. The supply and return piping should be re-piped and fence modifications/additions to enclose the generator should be completed.

Photo #36 – Diesel Aboveground Storage Tank

Photo #37 – Potable Water Well

Water supply to the building is via an onsite potable well. It has been stated that the well floods. Accordingly, the well should be raised above the flood elevation. In addition, the well needs a new pump and it was indeterminate if a backflow preventer. It is recommended that the well piping and system connections be reviewed to confirm the presence of a backflow preventer. Should one not exist, the backflow valve will be incorporated into the plan.

2.4.4 *Electrical & Controls*

Photo #38 & #39 –Status/Control Panel and Electrical panel

Incoming service is 120/240 volt three phase. The service comes from New Vernon Road and the electrical meter is installed adjacent to the electrical panel. The main service panel provides 400 amp which appears sufficient for the station. As is similar with other stations, the Township uses a Mission Control Cellular Monitoring/Alarm system.

The lighting system in the station is deficient. It is recommended that the lighting plan be reviewed and improvements incorporated into the 20 Year Capital Improvement Plan for sustained operation of the station.

2.4.5 *Long Term Capital Improvement Plan*

The following work should be considered for the long term maintenance and operation of the system:

- Install wet well safety grate;
- Fence repairs – replace barbed wire, as necessary;
- Paving of access driveway and shoulder;
- Roofing system replacement;
- Fill separation between building and louver and monitor;
- Monitor floor cracking;
- Consider addition of degreaser agent;
- Replace two (2) pumps (once during planning cycle);
- Replace two (2) check valves (once during planning cycle);
- Replace three (3) gate valves (once during planning cycle);
- Replace flow meter (twice during planning cycle);
- Grinder installation;
- Replace grinder teeth (once of the planning cycle);
- Spiral stairs – cleaning and support upgrades;
- Replace and relocate generator including concrete pad, piping modifications and fence modifications;
- Replace station doors;
- Raise potable well;
- Replace potable well pump;
- Install backflow preventer; as necessary;
- Lighting System Improvements;
- Ventilation Improvements.

2.5 Skyline Drive Pump Station


Photo #40 & #41 – Skyline Pump Station – front view and rear view

2.5.1 General Site Description

Photo #42 – Looking at Skyline Drive from station

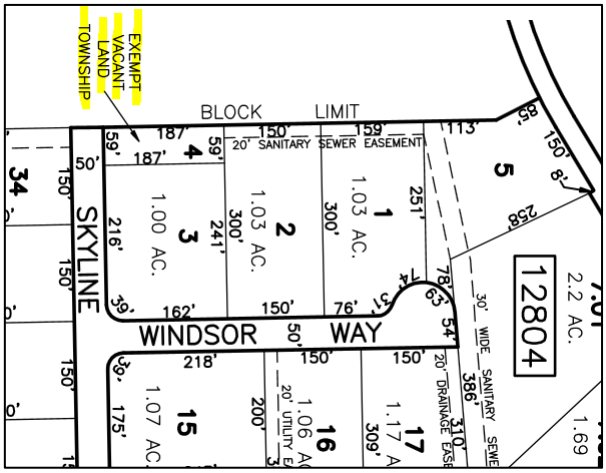

Photo #43 – Tax Map of Site - Block 12804 Lot 4

The Skyline Drive Pump Station is located in the north-western portion of the Township; at the end of Skyline Drive. The station is located on Block 12804, Lot 4 and is approximately 175 feet off of Skyline Drive. The station is accessible via a dirt pathway that leads to the station. The Skyline Drive Pump Station is the largest station (largest volume of flow). Accordingly, it is recommended that access to the station be paved to allow maintenance vehicles to enter the site without issue. The station is secured by a 6' high chain link fence with barbed wire top rail. The site has sufficient parking for both utility and maintenance vehicles.

The wet well for the facility is located at the rear of the site where flows from the surrounding residential area enter the site thru a 20' sanitary easement at the back of the site. An 8" force main exists the station and runs along Skyline Drive. There are no reported issues with odor associated with the station or force main.

2.5.2 Structural / Station Description


Photo #44 & #45 – Stairs / hatch to grinder

The pump station is a duplex pump station with a building that consists of poured concrete foundations supporting concrete walls with an exterior brick façade. Exterior steel lintels appear rusted and should be cleaned and painted. The below grade poured concrete walls extend to the wet well level. An exterior hatch at the rear of the building provides access to stairs leading to a grinder. At the time of construction, no access was provided to enable utility personnel to remove the grinder for cleaning, repairs or replacement. The wet well / grinder access should be modified to allow proper maintenance of the grinder and continued operation in the future.

Photo #46 – Soffits, shingles, fascia needing replacement

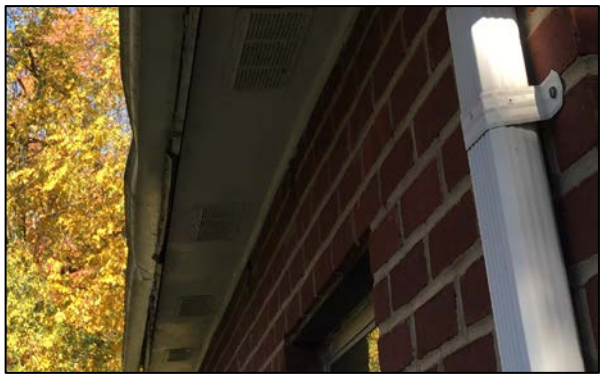

Photo #47 – Missing gutters

The roof is original in nature and is overdue for replacement. The roof system consists of a concrete plank flat roof covered with a wood-framed A-frame structure with access provided to this space from an interior ceiling hatch. The shingles

appear to be in poor condition and should be replaced. Existing gutters are damaged or missing and the entire gutter system should be upgraded to protect the structure from water infiltration. The wood soffits and fascia boards are also in poor condition and should be replaced.

The two (2) pumps for the station are Gorman Rupp self-priming pumps with 75 HP motors. The station has been by-pass pumping for 5 years because the pump shafts kept snapping. Utilizing a station on by-pass is preferred to be temporary from both an operational and regulatory perspective. The Skyline Drive Pump Station is the Township's largest station; receiving the greatest amount of flows and subsequently, impacting the greatest number of customers. It has been expressed that the station recently went back online. However, o*perating the station on by-pass for such a long period is not acceptable from a regulatory perspective. It is recommended that the Township limit the duration of by-pass pumping in the future.*

As noted previously, pumps/motors should typically be replaced every 10 years. For planning purposes, the Township should plan for two (2) rounds of pump replacements or reconditioning over the 20-Year planning period. The condition of the pumps and their associated operation can be examined during the projected 10 year life cycle for scheduled replacement. In addition, the intake / discharge valves should be replaced once over the planning period.

2.5.3 *Mechanical / Plumbing*

As noted, both pumps are 75 HP Flygt pumps that should be included in the 20-Year Capital Improvement Plan for budgetary routine operational replacement.

Inside the building is potable water and a wash sink. At the time of inspection, the valve for the water service to the station could not be located.

As noted previously, the grinder for the station must be modified to allow access and maintenance.

2.5.4 *Electrical & Controls*

Photo #48 –Diesel Generator at rear of building

Photo #49 –Automatic transfer switch inside

Incoming service is 277/480 volt three phase with a 600 amp main breaker. The service comes from Skyline Drive and runs above grade along the access drive. The electric meter is on the exterior of the building.

The generator for the station was installed in 2011 and is an Onan diesel generator rated at 250 kW. The Township maintains the generators and has an outside contractor inspects the generators once a year. Based upon the age of the generator, replacement *may be* needed during the 20-Year planning period. The Township should be aware that, based upon Federal guidelines, the lifespan for a generator is recommended to be 15-20 years. Due to the cost of generators, municipalities typically will allow a generator to remain in use past this recommended lifespan. While we do not recommend replacement of equipment that is operating to its original design parameters, we do recommend that the Township is aware of typical useful lifespans of equipment and plan accordingly.

In addition, it was noted that the existing generator is not sound attenuated. Due to its location near a residential neighborhood, it is recommended that when the generator is replaced, a sound attenuated generator be specified.

As with the other Township facilities, a Mission Control cellular alarm system

provides dial up service only.

2.5.5 *Long Term Capital Improvement Plan*

The following work should be considered for the long term maintenance and operation of the system:

- Pave access driveway;
- Modify wet well / grinder access;
- Clean and paint exterior steel lintels;
- Replace roofing system;
- Replace wood soffits and fascia;
- Replace gutters;
- Pump replacements (two times over the planning period);
- Check valve and gate valve replacements;
- Replace flow meter (one time over planning period);
- Possible replacement of generator to include sound attenuation.

2.6 Clover Hill Pump Station

Photo #50 – Aerial of Clover Hill PS

2.6.1 General Site Description

The Clover Hill Pump Station serves the area of Millington and is located at the

end Rainbow Drive and is accessible by a long unpaved access road which has been partially stabilized with asphalt millings. The station is located approximately 815 feet off of Rainbow Drive and is approximately 600 feet south of Rolling Hill Drive. A 6' high chain link fence with barbed wire top rail provides security for the station.

As noted in the below section, it is believe that the area is located within a conservation easement. If allowable, it is recommended that the station access road be regraded and paved for reliable access of utility and maintenance vehicles.

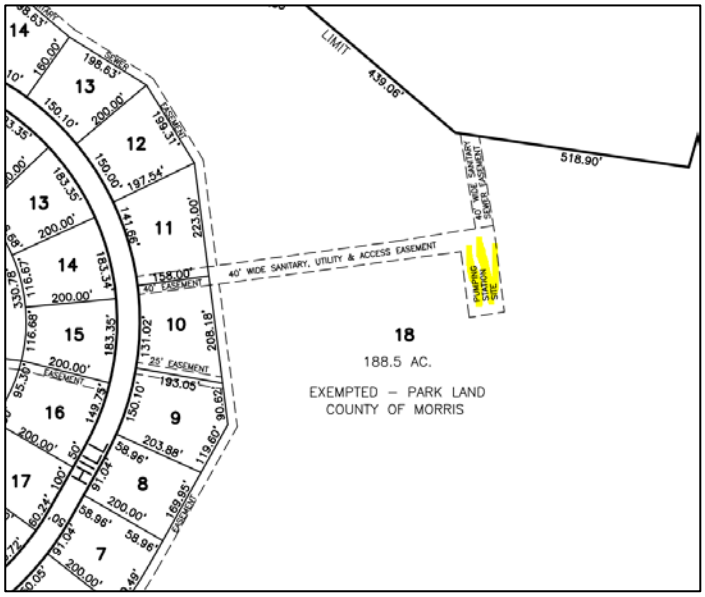

Photo #51 – Tax Map of Station

Photo #52 – View from access drive

As indicated Photo #51, it appears that the station is located on an easement on park lands owned by the County of Morris; Block 10101, Lot 18. It has been our experience in the past that pump stations located on park /county properties have inadvertently been turned over to Green Acres. This makes improvements to the station and utilities leading to the station difficult; if not impossible. *Accordingly, it is our recommendation that the Township confirm if the County lands have been turned over to Green Acres. If they have, it would be our recommendation to begin the process of having the utility and pump station areas removed from the Green Acres Rosi.*

Utility personnel were not aware of the original age of the station. Based upon historic aerials and the stamped date of some equipment onsite, the station was constructed prior to 1950 with the residential area surrounding the station being completed by 1995. Most of the equipment in the station is part of the original construction making the equipment at least 67 years old. As will be detailed in

upcoming sections, much of the station is past due for replacement.

2.6.2 Structural / Station Description

Photo #53 – Missing downspouts

Photo #54 – View looking up at roof – missing flashing

The pump station is a duplex submersible station and consists of a below grade wet well. The structure is a brick and CMU bearing wall structure on a concrete foundation with a lightweight concrete block roof. Overall the structure appears to be in good shape. However, metal edge flashing is damaged in some areas and downspouts are missing. It also appears that previously the downspouts discharged below grade.

The metal flashing should be replaced as well as the downspouts in order to protect the structure from water infiltration / damage. The discharge of the downspouts should be modified to allow discharge at ground level with concrete splash blocks. In addition, the roof appears to be original to the building and should be included for replacement during the planning period.

Photo #55 & #56 – Existing hoist – to be replaced

Interior to the building is a ½ ton capacity hoist. The hoist is original to the building and does function as required for the plant and personnel. A new I beam structure and suitable hoist should be incorporated into the capital plan and should incorporate current worker safety requirements.

The two (2) pumps are 20 HP Flygt Pumps that were replaced in 2010 and 2015. The pumps should be planned for replacement twice over the 20-Year planning period. In addition, the check valves and gate valves should be planned for replacement during the planning period.

2.6.3 *Mechanical / Plumbing*

Photo #57 & #58 – Propane Tank at rear of site

At the rear of the site is an 1800 gallon above grade propane tank that was built in 1950. The tank is sitting on bare earth and is sinking at one end. Portions of the tank

are rusted and bare metal is exposed. The tank needs to be replaced. It would be our recommendation to contact the Township's propane supplier and request a new tank. Due to today's installation requirements, the new tank may need to be relocated and/or put on a pad. Typically, the propane suppliers will require all tank pads and piping be in place and approved by the local code official before they will set the tank.

As noted previously, there are two (2) pumps at the station; 20 HP Flygt 3153. One pump was replaced in 2010 and the second pump was replaced in 2015. Based upon their ages, the pumps should be incorporated into the 20 year Capital Improvement Plan as noted. The check valves and gate valves associated with the pumps should be replaced during the planning period; ideally at the same time as one of the pump replacements. In addition, a grinder should be incorporated into the system prior to pump intake. This will reduce pump wear and reduce pump clogs and potential backups.

Photo #59 – Flow meter – to be replaced


Photo #60 – Electric Heater – to be replaced

The ventilation system of the station also requires upgrades. The ventilation system is a regulatory requirement that not only extends the life of equipment but reduces the buildup of gases and provides worker safety. Other features of the station which require upgrades/replacement are the flow meters and heating system.

There is a potable well onsite which supplies water to the station. It is anticipated that a new well pump will be required, at a minimum, once over the 20 year planning period.

2.6.4 *Electrical & Controls*

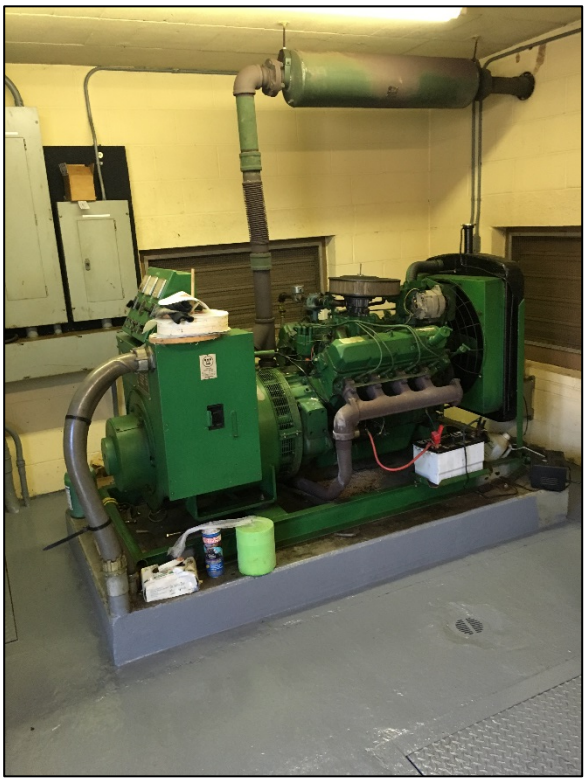

Photo #61 –LP Emergency Generator

Photo #62 –Electrical Service Panel

The service to the site is run above grade and appears to be running through the utility easement from Rolling Hill Drive. The service is 120/240, 3 phase and has a 200 amp main panel. The electrical system in the station is older and will require upgrading within the next 20 years. At the same time, the control panel should be upgraded.

The Maxi-Power L.P. generator at the station is 85 Kw and is older in nature. Utility personnel did not recall when it was installed. Maxi-Power generators were first used in late 1970's. Accordingly, it is assumed that the generator is at least 35 years old. Accordingly, it is recommended that the generator be scheduled for replacement as part of the 20-Year Capital Improvement Plan. At the time of replacement, the generator should be installed outside on a reinforced concrete pad.

The station is lacking sufficient lighting in the below structure; making it difficult to inspection and maintain the lower story equipment. Lighting should be added to the capital improvement plan. Due to the location relative to sewage gases, the lighting must be explosion proof.

In 2010, a Mission Control cellular alarm system was installed. The system is dial up

only.

2.6.5 *Long Term Capital Improvement Plan*

The following work should be considered for the long term maintenance and operation of the system:

- Review tax map and possible Green Acres issues;
- Pave access road, if permissible;
- Replace metal flashing;
- Replace downspouts and concrete splash blocks;
- Replace roof;
- Replace I beam and hoist;
- Replace propane tank and install tank pad;
- New generator on reinforced concrete pad including new transfer switch;
- Addition of grinder system;
- Replace two (2) 20 HP Pumps (2 times during planning period);
- Replace two (2) check valves and two (2) gate valves;
- New ventilation system;
- New electric heater;
- New potable well pump;
- Explosion proof lighting.
- Replace / Upgrade electrical service panel and control panel;
- Replace flow meter (two times over planning period).

2.7 Heritage Road Pump Station

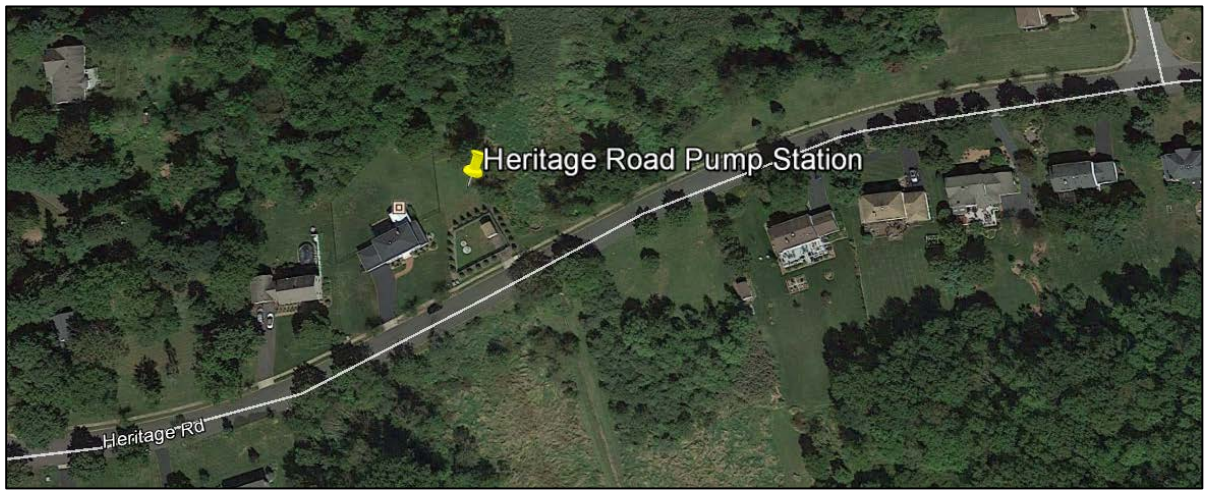

Photo #63 – Aerial of Heritage Pump Station

2.7.1 General Site Description


Photo #64 & #65 – Pump Station Fence & Emergency Generator / Control Building

The Heritage Road Pump Station services the residential area of Indian Run and Deer Run. The station is accessible from Heritage Road via an asphalt driveway. The driveway is long enough to park one utility vehicle. The station is secured by a 6' high chain link fence with a double swing gate and privacy slats.

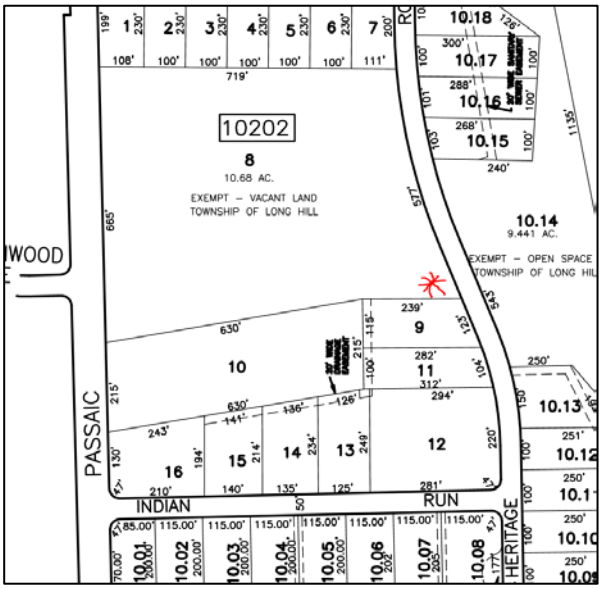

Photo #66 – Tax Map of Site – B 10202 L 8

The station appears to be located on Block 10202, Lot 8 which is a 10.68 acre parcel owned by the Township. The station, shown by the red demarcation, is immediately adjacent to a private residence. The force main from the station is either 4" or 6" and discharges to along Indian Run to Passaic Valley Road. There are no reported issues with odor associated with the station or force main.

2.7.2 Structural / Station Description


Photo #67 – Emergency Generator / Control Building


Photo #68 – Soffit requiring replacement

The pump station is a duplex submersible station and consists of a below grade wet well and valve vault. The emergency generator / controls for the station are located on site in a small building. The station was constructed in January 2011.

The building onsite is made of wood framing with a vinyl siding. The roof is pitched with newer dimensional shingles. The structure is in overall good condition with some missing or damaged siding and a soffit that should be replaced.

Photo #69 – Wet well (foreground) & valve vault

Photo #70 – wet well with controls

As noted previously, the station is a submersible pump station consisting of a below grade wet well and valve vault. With the wet well are two (2) pumps are 7.5 HP Cornell Pumps that were recently replaced in 2016. As a general rule of thumb, pumps typically require replacement approximately every 10 years. The condition of the pumps and their associated operation can be examined during the projected 10 year life cycle for scheduled replacement. However, for budgeting / planning purposes, pump replacements are planned on a 10 year cycle in the 20-Year Capital Improvement Plan.

In addition, the vault valves should be replaced at the same time as the pumps. While the replacement of the valves is not the same frequency as the pumps, the Township should plan for replacement of the valves once over the 20-Year planning cycle.

Also located onsite is a by-pass connection (red above grade piping in photo #69). The by-pass connection will allow the Township to bring in a secondary pump and easily by-pass pump around the station should the station have a pump failure.

2.7.3 *Mechanical / Plumbing*

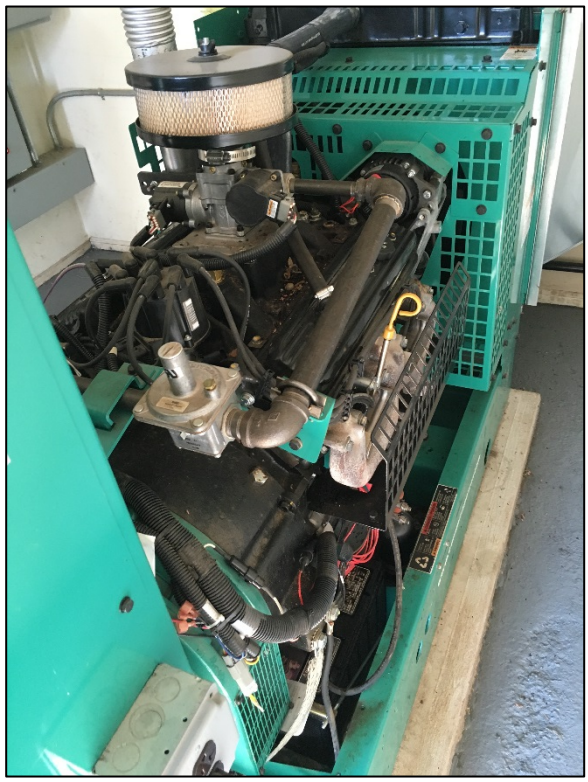

Photo #71 – Natural Gas emergency generator

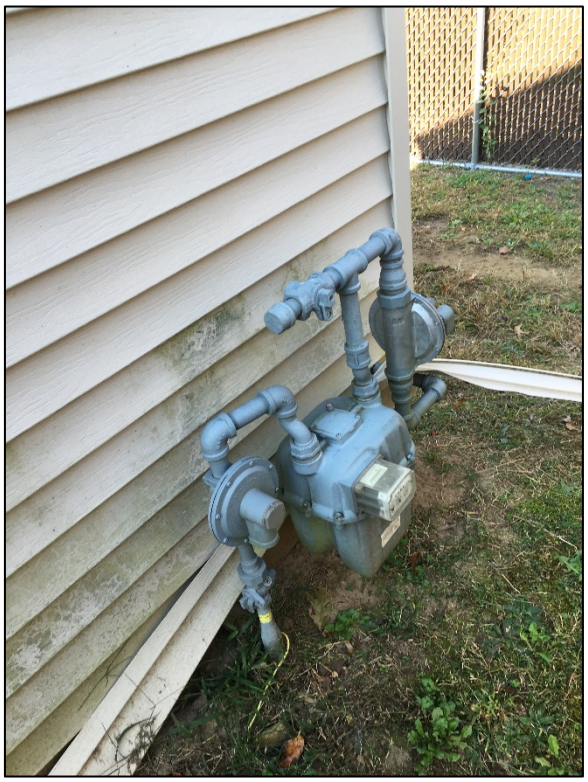

Photo #72 – Gas Regulator

The generator for the station is installed inside the onsite structure. The generator is natural gas with a 35 kW rating. There is no grinder at the station and no flow meter. Both items should be included in the long term 20-Year planning.

The Township should be aware that Federal guidelines establish the useful lifespan of a generator as 15-20 years. This guideline is to ensure operation of the equipment during emergency events. While we do not recommend replacement of equipment that is maintained and operating at its original design capacity, it is important for the Township to be aware of the accepted / standard lifespans of equipment. This will allow for budgetary planning and proper inspection of equipment as the equipment approaches its useful life.

2.7.4 *Electrical & Controls*

Photo #73 –Electrical service panel

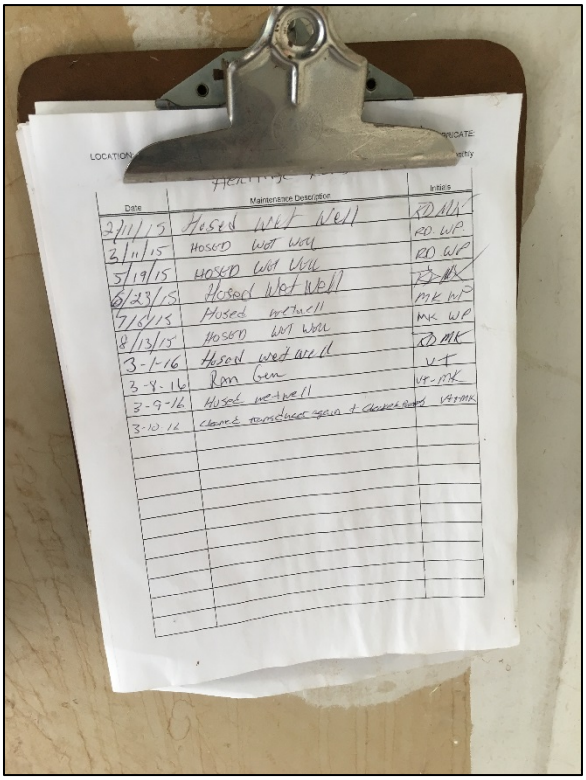

Photo #74 –Maintenance Log

Incoming service is 120/240 volt three phase. The service comes from Heritage Road and the electrical meter is installed on the exterior of the generator building. The main service panel provides 150 amp which appears sufficient for the station.

The pumps operate off floats / transducers which are cleaned off by the utility personnel once per month. However, as can be seen from the above logs, the maintenance at the facility has become less frequent. As noted by the utility personnel, the reduction in staffing has impacted their ability to complete routine inspection and maintenance of the system. It was noted that the utility department has been reduced from 6 personnel to 4 personnel. Consideration should be given to the addition of part time or full time staff to assist in the daily operational requirements of the sewer department.

4.7.5 Long Term Capital Improvement Plan

- Two (2) 7.5 HP submersible pump replacements (twice during planning period);
- Check valve and gate valve replacement;
- Flow meter installation;
- Grinder installation;
- Roof replacement;
- Generator replacement.

2.8 Union / Warren Avenue Pump Station

Photo #75 – Union / Warren Avenue Pump Station

2.8.1 General Site Description


Photo #76 – Elevated station

The Union Street or Warren Avenue Pump Station is located in lower Sterling. Overflows from the system come to the pump station in addition to the adjacent street flows. The station is accessible from a dirt access road off of Union Street. The driveway is long enough to park utility and maintenance vehicles. The station is secured by a 6' high chain link fence with barbed wire top rail and double swing gate.

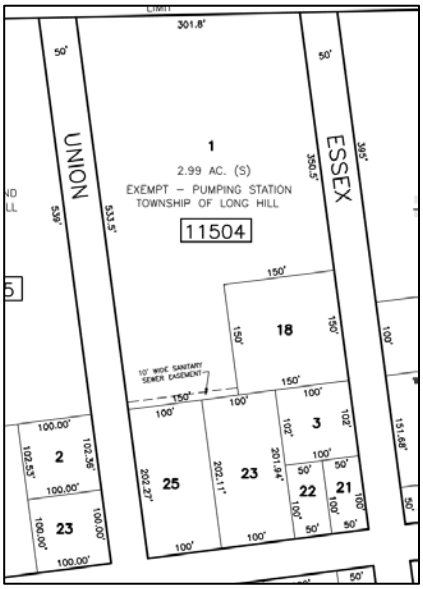

Photo #77 – Tax Map of Site – B 11504 Lot 1

The station appears to be located on Block 11504, Lot 1 which is a 1 acre parcel owned by the Township. The station is immediately adjacent to a private residence. The force main from the station is either 4" or 6" and discharges at the top of Union Avenue. There are no reported issues with odor associated with the station or force main.

2.8.2 Structural / Station Description


Photo #78 – Elevated controls and hatches

The pump station is a duplex station and consists of a below grade pumps and wet well. The station is built on the site which was a former house. The structure was knocked down and the station was constructed. The utility personnel provided comment that the station floods. Accordingly, it is assumed that the raised platform is above flood elevation. The electrical panel and controls are also raised. The original date of the station construction was unknown by the utility. However, the station was upgraded in 2011 with new pumps and raised electrical.

Photo #79 – Possible groundwater monitoring well

At the time of the facility tours, it was noted that there appeared to be a ground water monitoring well located on the site; adjacent to the stairs access the elevated platform. Should the Township choose to sell the utility, clarification on the nature of the assumed monitoring well will need to be provided.

The two pumps for the station are new as of 2011, however, following the standard 10 year planning cycle for pump replacement, the Township should plan for at least one round of pump replacements during the 20-Year planning cycle.

In addition, the intake and discharge valves should be replaced at the same time as one of the pumps.

2.8.3 *Mechanical / Plumbing*

Photo #71 – Diesel emergency generator

The Onan 50 Kw diesel generator for the station is not permanent (on wheels) and is connected to the pump station electrical with a wire and plug. In addition, the generator is not elevated above the presumed flood elevation. In addition, the generator does not have an automatic transfer switch. Accordingly, in the event of an emergency, the generator does not automatically turn on and utility personnel must man the station. The generator should be raised to the same elevation as the control and electrical panel and should be permanently fixed. In addition, an automatic transfer switch should be installed at the same time.

The Township should be aware that Federal guidelines establish the useful lifespan of a generator as 15-20 years. This guideline is to ensure operation of the equipment during emergency events. While we do not recommend replacement of equipment that is maintained and operating at its original design capacity, it is important for the Township to be aware of the accepted / standard lifespans of equipment. This will allow for budgetary planning and proper inspection of equipment as the equipment approaches its useful life.

2.8.4 *Electrical & Controls*

Photo #73 –Electrical service panel

Photo #74 –Maintenance Log

Incoming service is 120/240 volt three phase. The service comes from Union Street by above ground utility poles. The electrical meter is installed on the exterior of the main service panel. The main service panel provides 200 amp which appears sufficient for the station.

There is a grinder at the station installed prior to the pumps which was installed as part of the upgrades in 2011.

2.8.5 Long Term Capital Improvement Plan

- Two (2) 7 HP pump replacements (once during planning period);
- Check valve and gate valve replacement;
- Emergency generator elevation and transfer switch;
- Emergency Generator replacement;
- Flow meter installation.

3.0 Wastewater Treatment Plant

3.0.1 Background / Capacity Assurance

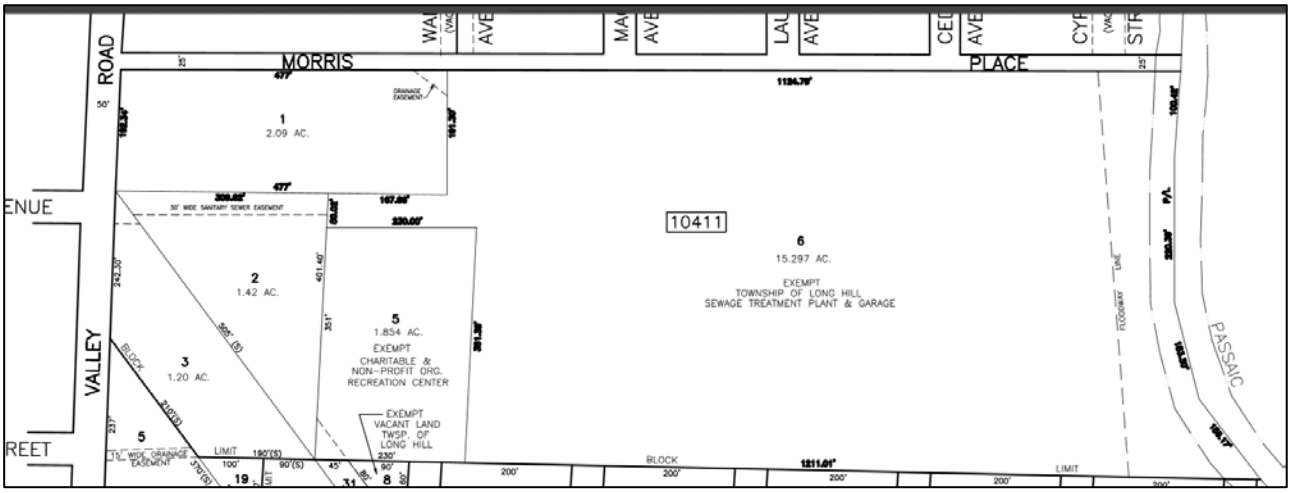

Photo #75 –Tax Map of Long Hill WWTP – Block 10411, Lot 6

The Township owns and operates the Long Hill Wastewater Treatment Plant (WWTP) located via a 30' wide utility easement at the end of South Warren Street. The site is Block 10411, Lot 6 and is a 15.29 acre parcel located adjacent to the Passaic River. The WWTP was originally constructed in 1930 and the current NJPDES permit has a listed capacity of 0.9 mgd with the discharge of treated effluent to the Passaic River.

When a treatment plant reaches 80% of the capacity listed in its permit, it is required to prepare a Capacity Assurance Plan. The purpose of the plan is to detail the owners' plans for assigning its remaining 20% capacity and/or developing plans for 1) plant expansion or 2) reduction in flows to meet the anticipated capacity demands.

In 2005, the Township completed their first Capacity Assurance Plan. The 2005 plan proposed a 50% reduction in Inflow & Infiltration (I&I) and upgrades to the plant to allow the Township to plan for their capacity demands. The reported average flows in 2007 and 2008 were 0.97 mgd and 1.14 mgd respectively and thus were above the permit listed flows.

In 2010, the Township completed their second Capacity Assurance Plan. At the time of this re-evaluation, the improvements recommended in the 2005 study were not completed. In addition, plant flows at this time were reported to routinely exceed the permit list capacity of 0.9 mgd; with the average flow of 1.02 mgd. Accordingly, the Township requested an updated Capacity Assurance plan to

evaluate 3 options for I&I reduction (0%, 25% and 50% reduction) and plant upgrades necessary to meet future effluent limitations.

It should be noted that while flows are not a permitted limitation, the effluent limitations must still be met. It is more difficult to meet required permit limitations when the flows of the plant increase. However, the plant is performing well and the permit effluent limits are met at flows greater than 0.9 mgd. However, storm events result in significant increases in flow due to unaddressed I&I; thereby reaching the hydraulic capacity of the plant. Therefore, with little flexibility in operations during rain events, the Township has restricted / limited connections to the system. To allow future development and redevelopment within the Township, I&I measures would be required to be implemented and including possible treatment plant upgrades.

Photo #76 –Aerial of WWTP on South Warren Ave.

The WWTP was originally constructed in 1930 and has undergone various stages of upgrades in 1978, 1984, 1991 and most recently in 2014. The upgrades completed in the most recent upgrades are as follows:

1991: Plant expansion including addition of one (1) oxidation ditch, two (2) clarifiers

and sand filter. Expansion was to 0.9 MGD capacity.

2014: Completed 14,000 feet of slip lining for I&I, new UV disinfection, and new rotor drum screens. No increase in plant capacity.

3.0.2 General Site Description / Facility Description

The facilities currently located /operating on the site consist of the following treatment process elements:

1. **Main Building** that includes utility offices, laboratory, breakroom, generator room and control room;
2. **Influent Pump Station** – submersible pump station that pumps sewage to screens;
3. **Two Rotary Screens**
4. **Two Oxidation ditches** – including lime slurry injection
5. **Two Clarifiers**
6. **Four RAS / Two WAS Pumps**
7. **Four Sand Filters**
8. **Post Aeration**
9. **UV Disinfection & Outfall**
10. **Sludge Storage**
11. **Sludge Thickening**
12. **Sludge & Screening Disposal**

3.0.3 WWTP Main Building

Photo #78 – Main Building

The main building is located at the front/entrance of the site and provides several different functions for the facility. Within the building is the operator office, plant laboratory, lime slurry room, generator room, boiler room, control room and worker break room.

Main Building - Control Room

Photo #79 & #80 – Control Room

The control room is new in age and houses the incoming electrical and controls for the main building, both oxidation ditches, four (4) pumps with Mitsubishi F-700 VFDs and aerator controls. The incoming electrical is 480 volt, 3 phase and serves a 1200 amp main panel.

It was noted that the alarm panel is not working. The alarm panel indicates the high level for the digester, high wet well level and generator run alarm. Based upon how the plant is operated, additional alarm additions are warranted as follows:

- Addition of low pressure alarm for sand filters;
- Addition of seal failure alarm for sand filters.

Main Building - Generator Room

Photo #81 – Generator

Photo #82 – Day tank that feeds generator

The generator room is located along the front of the building. The generator has a diesel engine. The fuel for the generator is supplied by a day tank that has a supply and return line to the fuel storage building located across the site. The supply and return piping runs below grade from the generator room to the fuel building; approximately 140 feet. Utility personnel stated that the below grade piping is double walled. The discharge for the generator is to the exterior of the building and air intake to the room is via motor operated louvers.

The generator is 500 kW and is approximately 26 year old. It is anticipated that the generator will be required to be replaced during the 20 year planning cycle.

Main Building - Boiler Room

Photo #83 – Boiler room

The boiler room is located adjacent to the generator room. Located within the room is the boiler for the Main Building, a 50 gallon oil fired hot water heater and a washer and dryer. The boiler was installed in 1991 and is serviced every other year and was last inspected in June 2016. At the time of inspection, there were no noted issues with the boiler. However, based upon the age of the boiler, for planning purposes, a boiler replacement should be incorporated into the 20-Year Capital Improvement Plan. In addition, the clothes washer for the utility personnel clothing was not working and may also be considered by the Township for replacement.

Main Building - Laboratory

Photo #84 & #85 – Laboratory and equipment

The laboratory and associated equipment are newer in age. Due to regulatory

requirements, updated testing equipment is necessary to maintain in the laboratory. Accordingly, budgetary planning for miscellaneous equipment replacement should be included in the 20-Year Capital Improvement Plan.

Main Building - Lime Room

Photo #86 – Above grade lime piping to Oxidation Ditch

Photo #87 – Slurry Tanks / Room

Lime is delivered and stored in the lower level of the lime room. Within the room are two (2) 6,000 gallon aboveground tanks. Every Tuesday, one foot of lime is added to the tank and the remainder of the tank is water. A catwalk across the top of the tank supports the automatic mixers for each tank. The Township receives a new load of lime every 2-3 moths.

The tanks and mixers were installed in 1991. The mixers and pumps are original and need to be replaced. The tanks are currently in good condition but have an anticipated useful life of 30 years and should be planned into the 20-Year Capital Improvement Plan. The lime transfer pumps are also original but only utilized once per week. Accordingly, the transfer pumps may only require replacement once over the planning period.

As noted in Photo #86 above, the lime room is located adjacent to the oxidation ditches. As can be seen in the photo, lime is run above grade and introduced into the oxidation ditches to adjust the pH of the wastewater to optimize nitrification (removal of ammonia).

Main Building - Structure

The Main Building is a CMU bearing wall structure with a flat concrete plan roof supported on concrete spread foundations. The exterior walls are double-wythe CMU with rusticated block at the exterior. Steel angle and beam lintels are provided for exterior wall penetrations. Floor drains are provided in the concrete slab floors where needed for equipment. Roof penetrations are framed with steel angles. The exterior entrance stairs and platforms are concrete with aluminum handrails.

No major structural damage was apparent at the time of inspection. Some stress cracks are evident in the walls around lintels and in the slab around floor drains and raised equipment pads. These should be filled with non-shrink grout and monitored for increasing crack width.

In the lime room, a hoist beam with trolley hoist runs the length of the room. Access is provided by a steel framed elevated platform with aluminum grating and handrails. A large roll up door is located in the end wall nearest the access platform.

In 2016, new central air was installed for the main building. The compressor installed on the roof. It is our understanding that the roof was replaced at the same time.

3.0.4 Influent Pump Station

Photo #88 –Influent Pump Station

Flows enter the treatment plant into the influent pump station; located at the rear of the Main Building. The station is a submersible pump station with a wet well and valve vault. The wet well is are approximately 25' deep. There are four (4) submersible pumps in the wet well; all Flygt pumps. The pumps are of varying speed and HP; consisting of:

- Pump #1 – Flygt Pump with 15 HP motor;
- Pump #2 – Flygt Pump with 20 hp motor;
- Pump#3 & #4 – Flygt Pumps with 44 hp motors that have trimmed impellers.

Pumps #1 & #2 run during normal operating conditions. When Pump #1 & #2 can't keep up, Pump #1 is not run and Pump #3 or #4 are run with Pump #2.

It should be noted that should the Township accepts additional connections to the system, to sufficiently handle the peak hourly flows project in the 2010 Capacity Assurance Study, the Township will be required to make reductions in I&I or modify / upgrade the influent pumps.

Due to the wear on the pumps, normal maintenance should include pulling and inspecting the pumps every 2 years. At the time, bearings and seals should be replaced. In addition to the routine maintenance, one (1) pump replacement should be planned every other year; resulting in a pump being replaced every 8 years. As noted previously in this report, the replacement schedule is for budgetary purposes and can be adjusted based upon performance of the pumps at the time of inspection.

A yard hydrant is located adjacent to the pump station to wash down the wet well. There are no apparent structural issues. However, it is recommended that the wet well be cleaned every month, as possible with the continuous flow, the clear the wet well of residual rags and grease.

3.05 Rotary Drum Screens

Photo #89 & #90 – Rotary Drum Screens

From the influent pump station, the sewage is pumped to the newer rotary drum screens located above sludge storage tank #1. The drums are having issues with rags and the sewage short circuits thru the screens when the largest influent pump is running. In lieu of the fine screens, a course screen may be better suited for this application Modifications / replacement of the rotary screens should be programmed to avoid fouling of the oxidation ditches and distribution boxes.

Once the rotary screens are replaced, routine maintenance is required to keep the screen clear. In addition, it the drums should be scheduled for replacement every 10 years due to life cycle costs of the motors and drum parts.

In addition, no grit removal is available at this time. The WWTP and pumps for the station would benefit from the addition of grit removal at the head of the plant.

3.06 Distribution Box No. 1 / Oxidation Ditches No. 1 & No. 2


Photo #91 & #92 – Oxidation Ditch #1 (upper/top view)

Post the rotary screens, the waste stream is separated. The screenings are diverted to one of the two sludge storage tanks. The screenings and sludge side of the treatment process will be discussed in upcoming sections. The other segment of the waste flow is sent to Distribution Box No. 1 at the entrance of the oxidation ditches.

Distribution Box No. 1

Distribution Box No. 1 is a concrete box with baffle. There are two (2) sluice gates that control the flow and two (2) 16" outlet pipes that feed the oxidation ditches. Internal weirs appear to also be steel with bolted connections. In some area, especially at the weirs and other members that come in contact with the wastewater, significant corrosion is evident. The corrosion will worsen over time. It is recommended that the weirs be replaced and all exposed steel be painted to preserve its lifespan.

From the distribution box, flows enter the oxidation ditches as detailed below.

Oxidation Ditch #1 & #2

The two (2) oxidation ditches are not the same size. Oxidation Ditch #1 is the smaller ditch at 300,000 gallon capacity which receives approximately 40% of the flow from the distribution box. Oxidation Ditch #2 is 600,000 gallon capacity and receives approximately 60% of the flow from the distribution box. Oxidation Ditch #2 is the newer structure constructed in 1991 as part of the expansion.

Photo #93 – Disk Drum for aeration

Photo #94 – Oxidation Ditch #2 – Steel Support for lime addition

In 2014, Ditch #2 was drained and debris was cleaned out. Prior to the 2014, the ditch was cleaned 10 years prior. It was noted during the cleaning of the ditch that 10 years between cleanings was too long and that more routine maintenance to remove debris would benefit the ditch operation Oxidation Ditch #1 (the older ditch) was noted to have never been cleaned and should be scheduled for draining, cleaning and tank repair. Accordingly, we recommended cleaning, tank repair and maintenance of the ditches, at a minimum, 3 times over the planning period.

Both ditches assist in the removal of CBOD and NH3 from the wastewater. For the removal of these two elements, air is added to the oxidation ditches via 2 disc aerators per tank. The motors for the disk aerators for the ditches are two (2) 40 HP motors (Ditch #2) and two (2) 30 HP motors (Ditch #1). The disk motors are original to the date of installation of each ditch and are past their useful life. It is recommended that the motors be replaced with high efficiency motors. In addition, it is recommended the motors be installed with VFD's to be controlled by the oxidation ditch oxygen content to further improve efficiency.

It should be noted that should the Township accepts additional connections to the system, to sufficiently handle the peak hourly flows project in the 2010 Capacity Assurance Study, the existing oxidation ditches and disk aeration equipment, as established in the study, are satisfactory without the requirement for upgrades.



Photo # 95 & 96 – Cracks, seepage and mineral buildup on oxidation ditch structures

Structural

The structures of the two oxidation ditches consist of reinforced concrete construction with steel framed access stairs, walkways and landings with aluminum grating and handrails. At the exterior of the tanks are large vertical stress cracks that are evident at regular intervals within mineral buildup surrounding the outline of the crack. This indicates some degree of seepage and resulting corrosion of the concrete structure at these location. All cracks should be sealed from the inside of the tanks and a concrete repair mixture specifically designed for wastewater applications should be applied.

3.07 Distribution Box No. 2 / Clarifiers No 1 & No 2

Distribution Box No. 2

Distribution Box No. 2 is located at the back of the facility and receives flows from the oxidation ditches. The box is a concrete structure with a baffle and two (2) sluice gates. The distribution box has two (2) 16" outlet pipes that go to the final clarifiers.

The sluice gate for the box is deteriorated and needs to be replaced. Similar to the first distribution box, all exposed metal components and connections should be painted with a coating suitable for corrosive, wastewater environments.

Clarifiers No. 1 & No. 2

Photo #97 – Clarifier No. 1 (right) and Clarifier No. 2 (left)

Photo #97A – Clarifier No. 1 (background) and Clarifier No. 2 (foreground)

The final clarifiers follow the oxidation ditches to allow the biomass or mixed liquor suspended solids (MLSS) that flows out of the oxidation ditches to be settled, thickened and returned to the oxidation ditches. The clarifiers also produce an effluent that is low in total suspended solids which is a permitted effluent limitation.

Photo #98 – Half bridge rotating arm and controls

Photo #99– Repaired tank structure with adjacent vertical crack

The clarifiers are 50' diameter, half bridge tanks. They are similar in construction to the oxidation ditches with poured concrete walls and a steel framed access platform with aluminum handrails and grating. It should be noted that the steel beam framing was previously epoxy coated but this coating appears to have worn off from corrosion over time. These tanks also exhibit the large vertical stress cracks found in the oxidation tanks and warrant the same proposed repairs. It should be noted that in 2016, Clarifier #1 had a blow out from one of the vertical stress cracks.

Utility personnel noted that the clarifiers are drained twice per year for maintenance. During one of the maintenance periods, the tanks should also be blasted and painted.

The half arm mixers should be replaced in both clarifiers once over the planning period. At the same time, the motors for the mixing arms should be replace as well.

It should be noted that should the Township accepts additional connections to the system, to sufficiently handle the peak hourly flows project in the 2010 Capacity Assurance Study, the existing clarifiers , as established in the study, are not sufficient without reduction in I&I or upgrade requirements.

3.08 Return Activated Sludge (RAS) Pumps & Waste Activated Sludge Pumps (WAS)

Photo #100 – Clarifier effluent enters the Filter

Photo #101 – RAS pumps No. 1& 2 with filters

Return Activated Sludge (RAS) Pumps

From the clarifiers, effluent enters the Filter Building adjacent to the clarifiers. The return activated sludge (RAS) is returned back to Distribution Box No. 1 and ultimately the oxidation ditches by four RAS pumps. The RAS pumps are 10 HP pumps that are VFD controlled. The RAS pumps were rebuilt or replaced within the last year. However, they should be planned for replacement or rebuilding at least twice over the planning period. In addition, there are two mixers for each sludge tank. The age of the blowers was not known at the time of inspection. However, based upon typical life expectancies of the mixers, a planned replacement should be incorporated into the 20-Year Capital Improvement Plan.

It should be noted that the utility is currently having operational issues with RAS pumps No. 3 & No. 4. Accordingly, the pumps should be pulled and replaced as needed to rectify the situation and allow complete operation of the four pumps.

At the time of the inspection, utility personnel were painting the floor and piping. It was planned to paint the remainder of the structures over the course of the following month as utility schedules would allow.

Photo #102 – HVAC and lights are inaccessible. Install catwalk for maintenance and repair

It was noted upon entering the filter building that there is no access to the upper portion of approximately ¼ of the room. This section of room houses piping which can be accessed from the ground level. However, there is elevated lighting and HVAC equipment that cannot be accessed by ground or ladder. Accordingly, a catwalk should be extended from the existing catwalk to allow this equipment to be maintained and repaired.

Waste Activated Sludge (WAS) Pumps

Located in the same Filter Building as the WAS pumps, are two (2) Waste Activated Sludge (WAS) Pumps. The pumps are located on the lower level of the Filter Building. As is similar to the RAS pumps, the pumps were rebuilt or replaced within the last year. They should be planned for replacement or rebuilding at least twice over the planning period.

The WAS Pumps waste biomass to the sludge storage tank that will be discussed in upcoming sections.

3.09 Sand Filters

Photo #103 – Sand filter effluent piping

Photo #104 – Air tank and piping to sand filters

As noted previously, the waste stream that exits the clarifiers is sent to the Filter Room. The Filter Room consists of four (4) Parkson Dynasand continuous backwash sand filters. The filers were designed to be continuously backwashed with no screens. The sand filter tanks have an internal vertical airlift that is supplied by the compressed air tank and piping shown Photo #104 above. The four sand filters each have six (6) air lifts for a total of 24 air lifts in the filter system. The air lifts are prone to holes due to the sand abrasion. The utility replaces the air lifts when they are no longer lifting. For planning purposes, two (2) air lifts should be budgeted to be replaced each year.

At the time of inspection, Sand Filter No. 4 was losing sand and the tank should be replaced or repaired. Due to the abrasion experienced due to the air lift operation, the Township should anticipated repairing or replacing at least one additional sand filter tank over the 20 year planning period.

Structural

The Filter /RAS WAS Building is similar in construction to the main building. The structure consists of CMU walls on a concrete foundation. Painted steel girders bearing the CMU pilasters support a concrete plank roof. A steel platform with a diamond plate walkway and aluminum handrails is to provide the filter room with access to each filter tank. As noted previously, a large air handling unit is hung in one corner with no access. A walkway should be extended to provide access for maintenance.

The building was construction in 1991 at the same time as the clarifiers as part of the plant upgrade and the roof is 26 years old. The Township should anticipate replacing the roof during the 20 year planning period.

At the exterior of the building is a wood framed shed and a pitched corrugated metal roof constructed over the UV disinfection basin. This shed and UV system will be discussed in upcoming sections.

The Filter Building contains its own heater/boiler that is a Weil Mclain oil fired burner rated at 810,000 BTU/hr that was installed in 1991. Fuel for the boiler is supplied above grade to from the Fuel Storage Building located next door.

Due to the age of the existing boiler, the Township should anticipate it will need replacement during the 20 year planning period.

It should be noted that should the Township accepts additional connections to the system, to sufficiently handle the peak hourly flows project in the 2010 Capacity Assurance Study, the existing sand filter equipment, as established in the study, are insufficient without the reduction in I&I or requirement for upgrades.

3.10 Post Aeration

Photo #105 – Post Aeration Channel

Photo #106 – Post aeration with UV building

Post sand filtration, the effluent enters an open air concrete tank. There are two (2) blowers; one 10 HP and one 88.5 HP. The blowers serve the 28 coarse bubble diffusers spaced at 2' intervals and provide the additional oxygen in the filtered effluent to meet NJDEP dissolved oxygen concentrations. The blowers are 10 years old and there are currently no issues with the size or function. However,

the blower motors are aging and should be replaced.

The aeration channel is equipped with a spray system to allow the introduction of a de-foaming agent. However, the finished water has little foam and the spray system is not currently utilized.

It should be noted that should the Township accepts additional connections to the system, to sufficiently handle the peak hourly flows project in the 2010 Capacity Assurance Study, the existing post aeration blowers, as established in the study, are insufficient without the reduction in I&I or requirement for upgrades.

3.11 UV Disinfection

Photo #107 – Interior of UV Building

Photo #108 – Leaking roof over UV Controls

The current disinfection method is UV light. The Trojan 3000Plus UV disinfection was added in 2011 as part of the treatment plant upgrades. The UV system is located off the blower room and adjacent to the post aeration tank.

The valves for the system are mechanical. For ease of control and operation, it is recommended that the valves are equipped with electric actuators.

Due to the expansion / addition of the UV system, a wood framed shed with pitched corrugated metal roof was constructed over the UV open channels. There are 2 channels with 1 bank per channel. Included in open channels are 40 modules with 4 lamps per module. The controls for the UV system are located in the same room; adjacent to the channels. There are areas where the roof are leaking due to inadequate roofing material. One of the leaks is located over the

UV control panel and a plastic tarp is being used to protect the controls from water damage.

Photo #109 – Cantilevered UV Building – requiring additional support

The UV Building should receive a new, properly flashed roofing system. Structural support should also be added where the shed floor cantilevers pas the elevated slab.

It should be noted that should the Township accepts additional connections to the system, to sufficiently handle the peak hourly flows project in the 2010 Capacity Assurance Study, the existing UV Disinfection System, as established in the study, are insufficient without the requirement for upgrades.

3.12 WWTP Outfall

Photo #110 – Tree/Debris near outfall

Photo #111 – Outfall headwall

The final treated effluent from the plant discharges to the Passaic River; approximately 200' from the plant. At the time of this report, the plant was achieving its discharge effluent limits; despite the flow about the permit listed plant capacity.

The outfall to the Passaic River is via a 16" pipe with headwall structure. In the vicinity of the outfall, the river was displaying severe siltation and falling trees/debris. To allow for the continued function of the outfall, without incident, the Township should work with the governing agencies to clear the area of the river surrounding the outfall.

3.13 Sludge Process

Sludge / Digester Building / Tanks

Photo #112 – Sludge Building / Tank

The sludge building is the original structure of the treatment plant and is located closest to the river. The building is prone to flooding and flood gates should be provided for the building to protect from water infiltration and preserve the equipment and treatment operation. Currently, the utility must disconnect equipment and place on blocks prior to an anticipated flood event. This is disruptive to operations and the treatment process.

On either side of the Sludge / Digester Building are two (2) 25' diameter aerated concrete tanks. The total useable storage volume of the tanks is 150,000 gallons.

One of the tanks (Tank No. 2) receives waste activated sludge by was of the waste activated sludge pumps. The other tank (Tank No. 1) receives thickened waste activated sludge from the mechanical thickener located in the building. The digester tanks are original construction and were part of the original plant. Coping stones around the base of the tank should be replaced / repaired. Also the tanks should be drained, cleaned and the interior recoated to protect the structure.

Photo #113 – Screw press and screenings dumpster

Photo #114 – Sludge Building / Tank

Also located in the Sludge/Digester Building are polymer tanks, blowers and sludge transfer pumps for the holding and thickening of sludge. Also included on the exterior of the building is a screw conveyor to transport the screenings to a dumpster on the exterior of the building. The plant cleans the rags and removes the dumpster about 1 per week.

There are two (2) sludge thickening pumps which are past due for replacement. Accordingly, this work including a minimum of two (2) additional pumps replacements should be considered during the 20-Year planning period.

The polymer machine in the building is also showing signs of age / ear and should also be scheduled for replacement.

Includes in the building are two (2) sludge transfer pumps. Neither of these pumps are utilized since sludge is transferred by gravity flow instead.

Structure

Photo #115 – Digester Tank

Photo #116 – Polymer Tank

The digester building is the original treatment plant building and consists of a brick and CMU bearing wall construction with integral sludge tank, resting on a concrete foundation. One main girder and steel bar joists support a wood board roof with a newer CPDM roofing system. The doors and windows of the building have also been updated.

Photo #117 & #118 – Sludge Building / Tank – ponding water on roof

At the roof level, an aluminum framed platform and stairs with fiberglass grating and aluminum handrail provide access to the sludge pump controls. Although the roof is newer, significant ponding was noticed at the time of inspection around the

drainage scuppers located 1-2 inches above the roof surface. As the scuppers are the only source of drainage for the flat roof, this area should be re-sloped, or the scuppers enlarged to conduct flow and minimize standing water.

3.14 Fuel Storage Building

Photo #119 – fuel storage tanks and piping

Photo #120 – Fuel Storage Building

Located adjacent to the Filter Building is the fuel storage building. Located in the building are two above ground storage tanks. One tanks is 3,000 gallon tank and stores heating oil for the facility heaters. There is also one (1) 1,000 gallon tank and stores diesel for the generators.

Based upon records provided by the utility, tanks are filled every 2-3 months. The pumps for the tanks are older in nature and should be replaced. In addition, ventilation should be added to the building to remediate the combustible fumes emitted from the tanks.

3.15 *Long Term Capital Improvement Plan*

The following work should be considered for the long term maintenance and operation of the wastewater treatment plant:

- Main Building – generator replacement;
- Main Building – repair alarm panel with additional alarm settings;
- Main Building – boiler replacement;
- Main Building – replace lime mixers and pumps;
- Main Building – replace lime storage/mixing tanks;
- Main Building – replace lime transfer pumps;
- Main Building – minor structural crack repairs;
- Main Building – washer replacement;
- Influent Pump Station – pump replacement; one every other year;
- Influent Pump Station -Pull pumps, Inspect, and replace seals/bearings; every other year;
- Rotary Drum Screens – replace screens with proper manufacturer/model;
- Rotary Drum Screens – replace drums/motors (once per planning period);
- Distribution Box No. 1 – replace sluice gate, paint exposed metals;
- Oxidation Ditch No. 1- drain, clean and repair tank (3 times over planning period);
- Oxidation Ditch No. 2 – drain, clean and repair tank (3 times over planning period);
- Oxidation Ditch No. 1 – replace motors and install VFD's;
- Oxidation Ditch No. 2 – replace motors and install VFD's;
- Distribution Box No. 2 – replace sluice gates, paint exposed metal;
- Clarifier No. 1 & No 2 – repair vertical stress cracks;
- Clarifier No. 1 & No. 2 – drain, blast and paint;
- Clarifier No. 1 & No. 2 – half arm mixer and motor replacement;
- RAS Pumps No. 3 & 4 – resolve clogging issues:
- RAS Pumps No. 1 thru 4 – replace twice over the planning period; minimum;
- Sand Filter Building – install catwalk to access air exchanger and lights for replacement/maintenance;
- WAS Pumps No. 1 &2 – replace twice over planning period; minimum;
- Sand Filters – replace two (2) air lifts (each year during planning period)
- Sand Filters - Replace Sand Filter No.4;
- Sand Filters - Replace Miscellaneous Sand Filter;
- Sand Filters – Building Roof Replacement;
- Sand Filter Building – replace boiler;
- Post Aeration – replace two (2) blower motors (2 time during planning period);
- UV Disinfection – replace roof and provide structural support;
- UV Disinfection – Lamp replacements (routine maintenance cost);

- UV Disinfection – automatic actuators;
- Outfall – clear surrounding area, as permitted by governing agencies;
- Sludge Building – install flood gates;
- Sludge Building – replace two (2) sludge thickening pumps (3 times during planning period);
- Sludge Building – replace polymer tank;
- Sludge Building – replace blowers;
- Sludge Building – repair roof / scuppers;
- Sludge Digester Tanks – repair structure / coping stones;
- Sludge Digester Tanks – empty, clean and recoat;
- Fuel Storage Building – replace fuel pumps (twice during planning period);
- Fuel Storage Building – install ventilation.

4.0 Wastewater Collection System Evaluation & Capital Improvement Plan

Photo #121 – Sanitary System Map

4.0.1 Existing Wastewater Collection System

The wastewater collection system is older in nature; consisting mostly of vitrified clay pipe (VCP) and asbestos cement pipe (ACP). Much of the infrastructure was installed in the 1930's and 1940's when the original WWTP was constructed. However, much of the system was also constructed in the 1970's with the construction grants era and the first round of upgrades to the original WWTP.

Based upon available records and inventory, the 286,290 linear feet of gravity main in the system is comprised of the following:

- 14,700 feet of 14" diameter pipe (ACP);
- 8,850 feet of 12" diameter pipe (ACP);
- 29,440 feet of 10" diameter pipe (VCP);
- 232,300 feet of 8" diameter pipe (VCP).

The collection system also includes approximately 1,260 manholes and 221,325 feet of privately owned sanitary laterals. The ownership of the sanitary laterals is borne by the customer; from the main to the home.

The Township does not keep a log of emergency calls. However, utility personnel have commented that there are limited emergency calls.

There has been much discussion in recent years regarding the anticipated lifespan of our underground utility piping. There has also been much discussion on how to plan for the systematic upgrade of utility piping to prevent the backups, failures and even collapse of a conveyance system. This "underground" portion of a sanitary system typically goes unimproved and improvements are typically reactive rather than proactive.

Therefore, proper planning and allocation of resources for the sanitary collection system must also be implemented into any Long Term Capital Improvement Plan. When examining the Township of Long Hill wastewater collection system and improvements to incorporate into their Long Term Capital Improvement Plan, the following was considered:

- The size and material of the sanitary main;
- The number and location of sanitary backups or failures;
- Locations within the system with pipes at capacity;
- Success of Inflow & Infiltration Program;

- Success of routine jetting/cleaning of sanitary collection system
- Success of Sanitary Televising Program;
- Lateral Service Connection / Rehabilitation Program.

The above considerations are summarized as follows:

Size and Material of Sanitary Main

The majority of the sanitary collection system is 8" diameter. Without system modeling of the conveyance system, it appears that the sanitary piping may be, in general, sized for the flow capacities of a system the size of the Township.

However, during sanitary system design, a conveyance system is not designed for excessive I&I situations. There are sections of the utility system that are located within the 100 year floodplain.

Number and Location of Sanitary Backups or Failure

The Township does not currently keep a log of system failures or backups. However, utility personnel have noted that the Mountain Ave area and Gillette area near the train station are areas of high flows and surging.

In order to better prioritize the rehabilitation of sanitary main on an annual basis, it is recommended that the Township begin recording the date and location of all sanitary breaks and backups. This information will allow the Township to prioritize the sanitary main replacement / rehabilitation or areas which need more routine maintenance (i.e. jetting).

Location within system with pipes flowing at capacity

The Township does not have an inventory of conveyance system capacities. However, based upon observations by the utility personnel, there are no areas demonstrating capacity issues during dry weather events.

There are areas of the system with high infiltration rates and high peaking factors were identified in the 2013 NJEIT Engineers Report prepared by Omni Environmental as part of the Trust submission requirements.

The report outlines the I&I studies completed, their results, and the areas prioritized for lining / rehabilitation. The prioritized areas were listed as:

- Area surrounding the WWTP (low lying area);
- Clover Hill Area;
- Morristown Road Area;

- New Vernon Area;
- Skyline Area.

Success of Inflow & Infiltration Program

The Township has completed various stages of a comprehensive I&I study which identified prioritized areas based upon flow meter readings as well as pump station data. The I&I study also identified manholes and lateral connections which required rehabilitation to reduce I&I. The details of this study were outlined in the 2013 NJEIT Engineers Report prepared by Omni.

Additional work completed as part of the I&I program is as follows:

- 2001 – 62 manhole leaks rehabilitated;
- 2009 – smoke testing completed to establish connections;
- 2011 – 28 manholes identified as having minor to heavy leaks and in need of rehabilitation;
- 2013 – 22 manholes raised in flood areas;
- 2014 – 14,000 feet of sanitary main lined.

The I&I Study prioritized other areas, manholes and lateral connections for rehabilitation. The Township has planned to completed additional work on this area but has not allocated the resources to complete this work since the 2014 project.

Success or Routine Jetting / Cleaning of Sanitary System

The Township jets a section of town each year. The jetting and camera is shared with Berkley Heights. In addition, the Township has identified the regions of Millington and Sterling as having root issues. The Township is on a schedule to cut the roots on an annual basis.

It is recommended that the jetting areas, if not already done so, be prioritized to areas of heavy grease (i.e. commercial or restaurant areas). The jetting or cleaning of the mains will prevent the buildup of grease, rags and debris from collecting in an area; lending to backups and overflows.

Success of Sanitary Televising Program

The Township has an advanced televising program. In fact, the entire system has been televised within the last 4 years. It is recommended that as areas of the system are rehabilitated, that post-rehabilitation televising be completed to ensure the proper lining and/or grouting of the sanitary mains as well as to confirm re-instatement of the laterals.

Otherwise, we find no deficiencies in the frequency of the Township sanitary

televising program.

Lateral Service Connection / Rehabilitation Program

The Township does not own the sanitary laterals. During the I&I study, comment was provide that much of the I&I issues may be attributed to lateral connections. The Township has incorporated the lining of the laterals at the main into the lining projects they have completed.

4.0.2 Long Term Capital Improvements – Collection System

The 2010 Capacity Assurance Plan prepared by Omni recommends that completing I&I reductions measures may not be the most cost effective method of achieving additional treatment capacity at the WWTP. While this may be a valid statement in terms of treatment, it is our opinion that rehabilitation of the sanitary conveyance system should be budgeted into the planning process.

While making improvements to the sanitary piping system may not provide the necessary impact to the treatment process, the conveyance system is aging. The existing VCP and ACP is prone to infiltration. Accordingly, a comprehensive 20-Year Planning Document must strategically plan for the rehabilitation of the oldest infrastructure.

Therefore the following is recommended for planning and budgetary purposes:

- Planning and budgeting for biased and systematic lining or replacement of the critical areas of the collection system. For estimation purposes, the Township should include replacement of 25% of the collection system over the 20 year analysis period. This would equate to a 1.25% system replacement each year over the next 20 years. It should be noted that this replacement schedule is **not** aggressive. **Instead, this proposed planning and budgeting schedule will still result in approximately 50% of the Township sanitary main to be over 100 years old at the end of the 20 year planning time frame**. While this may put much of the sanitary main past or near its useful life, the Township will have the opportunity to annually re-examine the condition of the infrastructure over the next 20 years and allocate additional resources for additional replacements as necessary. In addition, this conservative approach factors in the uncertainty of the pipe material lifespans.

5.0 Future Considerations / NJDEP DSW Permit

The evaluation of the treatment plant was based upon current conditions and the long term capital improvement plan prepared accordingly. However, as the Township is aware, regulations regarding WWTP and effluent limitations are in a constant state of review by State and Federal regulators. Accordingly, effluent limits currently imposed on the treatment plant may change in the future; requiring an upgrade in the treatment process.

We have reviewed the last NJDPES DSW permit issued to the Township. While this permit has expired, the utility personnel have stated that the NJDEP is in receipt of the permit renewal and the Township is currently waiting for the new permit to be issued.

Based upon our review of the former permit, the following parameters may be further imposed by the NJDEP:

- **Copper & Zinc**

  The NJDEP formerly provided an off ramp from the permit limitations if a site specific translator could be developed. If this off ramp is offered in the upcoming permit and the Township desires to keep the sanitary system, it is our recommendation that a WER Study be completed for these parameters. We have been successful with other clients in completing this study and receiving relief from these parameters in final permits. Otherwise, the Township may be required to treat the effluent for copper and zinc which are attributable to the potable water concentrations.

- **Phosphorus**

  The current permit does not have a limitation on phosphorus and is currently reporting only. However, it was noted that there has been discussions with the Township that a phosphorus limit may be imposed due to the receiving water body water quality issues. This limitation may be imposed in the current permit currently being issued by the NJDEP. Initial discussions estimate that the phosphorus limit may be as stringent as a monthly average Total Phosphorus limit of 0.76 mg/l.

  Should this permit limitation be required, there will be initial and interim permit limits that will allow the Township to achieve compliance. However, modifications will be necessary at the plant.

Typical methodologies for phosphorus include:

- Chemical removal thru possible modification in the existing treatment process and the addition of chemicals to precipitate the phosphorus for removal;
- Biological removal thru possible modifications in the existing treatment process and modifications to aerobic / anaerobic zones;
- Filtration removal thru possible modifications in the existing treatment process.

Based upon preliminary engineering estimates completed in the 2010 Capacity Assurance Plan, chemical addition and filtration improvements to the existing plant would cost about **$1.2 million**. Additional operating costs for chemical addition, sludge removal, etc. were provided. For budgetary purposes, we have included an additional **$85,000** in chemical costs in the future for phosphorus removal.

Accordingly, these costs have been included as a notation in the 20-Year Capital Improvement Plan.

6.0 Future Considerations / Septic System Failures

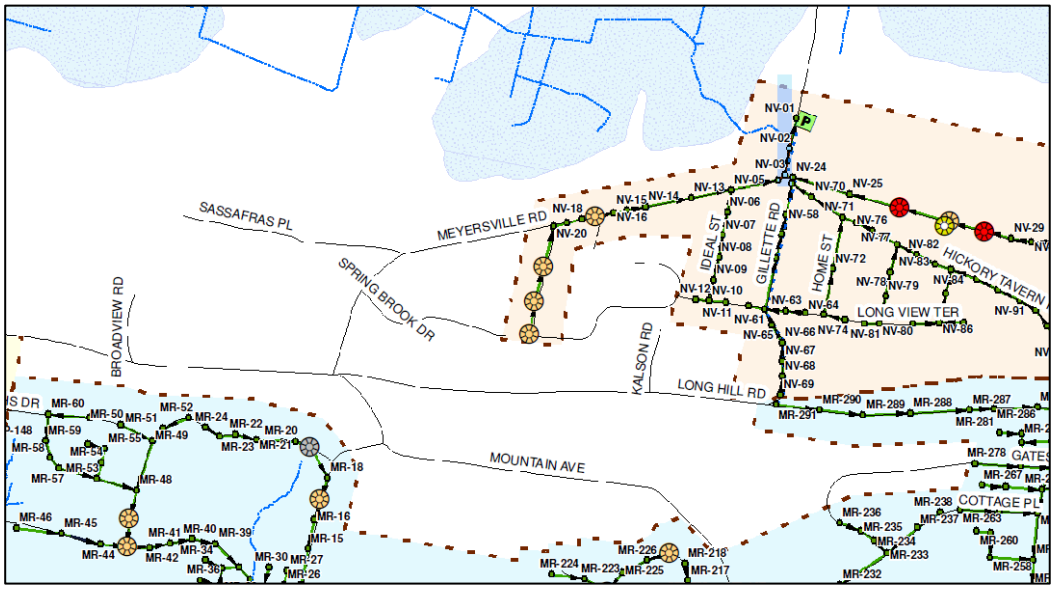

Photo #122 – Septic System Area – in white (no infrastructure)

Approximately 88% of the housing units in Long Hill are connected to the sanitary

system. The remaining 12% are served by individual septic systems. There are currently no mandatory tie-ins imposed by the Township on septic owners. However, as septic systems age and potentially reach failure and they may not be viable to rehabilitate, consideration should be given to allow the homeowners to connect to the public system, if possible.

Based upon our review of the available system mapping and tour of the Township, our review indicates that the septic areas appear to be in portions of Long Hill Road in the vicinity of Sassafras Place, portions of Mountain Ave and portions of Meyersville Road. There currently appears to be no infrastructure in these areas which are residential in nature.

Accordingly, should the homeowners desire to connect to the public sanitary system, the Township would need to construct infrastructure. The 1995 Master Plan adopted by the Township allows / encourages extension of the sanitary system in these areas only.

Based upon preliminary reviews, should the septic areas be capable of being connected by the addition of gravity main only (no additional pump stations), the Township would be looking at a considerable amount of infrastructure to construct. Our preliminary layout suggest that over 12,000 feet of gravity sanitary main would need to be constructed at a cost of over $3.5 to 4 million.

The magnitude of the costs incurred by the Township to supply sanitary to the septic areas would dictate mandatory connections and upgrades would be required at the plant in accordance with the 2010 Capacity Assurance Plan.

This is a major expense to be incurred by the Township. Accordingly, these costs have been included as a notation in the 20-Year Capital Improvement Plan.

7.0 Sanitary Utility Staffing & Vehicles

The Sanitary Utility presently consists of four (4) staff members including the licensed operator.

The Utility personnel responsibilities include all service calls, daily inspection and maintenance of the pump stations, and sanitary main repairs up to 6 feet deep. For sanitary main issues deeper than 6 feet, an outside contractor is hired.

The Sanitary Utility used to be a staff of six (6). Since the reduction in staffing, the daily maintenance has been reduced to keep up with workload.

The Wastewater Department utilizes five (5) vehicles. A breakdown of the vehicles by age and replacement costs are presented in **Appendix C**. It should be noted that the current vehicles consist of a vac truck that is 15 years pickup trucks / utility trucks that will range between 35 to 13 years old at the end of the 20 Year Planning Period. Accordingly, the replacement of the vac truck and vehicles has been incorporated into the 20 Year Capital Improvement Plan. The replacement cycle is based upon typical useful life expectancies for similar equipment / vehicles. The fixed asset replacements are for planning and budgeting purposes and should be re-examined to determine the condition at the time of the planned replacement.

8.0 Sanitary Utility Rates / Billing

The rates for the utility change every year and are established for the utility to "break even" at the end of the year. The billings are based upon water consumption and are prepared once per year.

The connection fees for a new service is a flat rate of $10,600 and based upon information provided by the utility, this rate has not been adjusted for some time.

Should the Township desire to keep the system, consideration should be given to establish a rate structure for the utility. The 20-Year Capital Improvement Plan presented herein can be utilized to establish the rate basis to fund the proposed improvements and sustain the utility.

9.0 Utility 20 Year Capital Improvements Plan

For planning purposes, this evaluation includes a 20-Year Utility Capital Improvement Plan. This list is presented in **Appendix A and Appendix B** herein and details proposed projects from 2017 through 2036. Please note that the list is loosely outlined by facility and priority of projects may shift based upon emergencies or changes in the conditions. In addition, the costs associated with each project represent roughly estimated construction costs and may / may not reflect the entire scope of the project once the specific elements are identified during the preliminary design phase. The provided list is not utilized by the Township for bonding purposes but merely utilized as a planning and organizational mechanism. It should be noted that if the utility improvements result in the disturbance of the full roadway, the Utility currently bears the cost of the road replacement.

Appendix A

Proposed 20-Year Pump Station & WWTP Improvement Plan (2017 to 2036)

PROPOSED 20 YEAR CAPITAL IMPROVEMENT PLAN (2017 - 2036)

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 1 - 2017	
VALLEY ROAD PS - BACKFLOW PREVENTER	$10,000.00
KING DRIVE PS - BACKFLOW PREVENTER	$10,000.00
VALLEY ROAD PS - FENCE	$5,000.00
VALLEY ROAD PS - FLOW METER	$15,000.00
MORRISTOWN PS - TREE MAINTENANCE	$15,000.00
NEW VERNON PS - WET WELL SAFETY GRATE	$10,000.00
NEW VERNON PS - RAISE POTABLE WELL	$2,500.00
WWTP-MAIN BLDG - ALARM PANEL REPAIR & UPGRADES	$18,000.00
WWTP - MAIN BLDG - MINOR STRUCTURAL REPAIRS	$2,000.00
WWTP - MAIN BLDG - WASHER REPLACEMENT	$500.00
WWTP - REPLACE ROTARY DRUM SCREEN - COARSE MESH	$200,000.00
WWTP - CLARIFIER 1 & 2 - REPAIR VERTICAL STRESS CRACKS, DRAIN & PAINT	$85,000.00
WWTP - RAS PUMPS 3 & 4 - CLOGGING ISSUES	$20,000.00
WWTP - SAND FILTER BUILDING - CATWALK CONSTRUCTION	$100,000.00
WWTP - UV BUILDING - ROOF REPLACEMENT & STRUCTURAL SUPPORTS	$40,000.00
WWTP - DIGESTER BLDG - ROOF / SCUPPER REPAIRS	$8,000.00
CONTINGENCY / INFLATION COSTS - 12%	$64,920.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$109,065.60
ESTIMATED CAPITAL IMPROVEMENTS 2017	*$714,985.60*
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2017	*$813,664.60*
TOTAL ESTIMATED IMPROVEMENT COSTS - 2017	**$1,528,650.20**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 2 - 2018	
UNION AVE PS - GENERATOR ELEVATION & TRANSFER SWITHC	$35,000.00
NEW VERNON PS - FENCE REPAIRS	$10,000.00
MORRISTOWN PS - SPIRAL STAIR MAINTENANCE	$1,000.00
WWTP - DISTRIUBTION BOX 2 - REPLACE SLUICE GATE	$25,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - REPLACE SAND FILTER 4	$100,000.00
WWTP - DIGESTER BLDG - REPLACE POLYMER TANK	$20,000.00
REPLACE 2500 PICKUP TRUCK	$28,000.00
CONTINGENCY / INFLATION COSTS - 12%	$28,080.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$47,174.40
ESTIMATED CAPITAL IMPROVEMENTS 2018	*$309,254.40*
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2018	*$813,664.60*
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2018	**$1,122,919.00**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 3 - 2019	
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
KING DRIVE PS - RAISE ELECTRICAL PANEL	$6,000.00
MORRISTOWN PS - WET WELL HATCH, STAIRS & SAFETY GRATING	$20,000.00
MT VERNON PS - MINOR STRUCTURAL REPAIRS	$3,000.00
SKYLINE DRIVE PS - MODIFY WET WELL/GRINDER ACCESS	$35,000.00
WWTP - DIGESTER BLDG - FLOOD GATES	$45,000.00
WWTP - DIGESTER BLDG - 2 SLUDGE THICKENING PUMPS	$30,000.00
REPLACE F-250 TRUCK	$30,000.00
CONTINGENCY / INFLATION COSTS - 12%	$23,880.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$40,118.40
ESTIMATED CAPITAL IMPROVEMENTS 2019	*$262,998.40*
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2019	*$813,664.60*
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2019	**$1,076,663.00**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 4 - 2020	
VALLEY ROAD PS - TWO 7.5 HP SUBERSIBLE PUMPS	$30,000.00
VALLEY ROAD PS - GATE VALVES & CHECK VALVES	$30,000.00
KING DRIVE PS - TWO 3 HP SUBMERSIBLE PUMPS	$35,000.00
KING DRIVE PS - GATE VALVES & CHECK VALVES	$25,000.00
SKYLINE DRIVE - ROOF SYSTEM, GUTTERS, SOFFITS	$35,000.00
OXIDATION DITCH 1 - REPLACE MOTORS & VFD ADD	$100,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - UV - AUTOMATED ACTUATORS	$50,000.00
WWTP - FUEL BLDG - VENTILATION SYSTEM	$45,000.00
WWTP - PHOSPHORUS UPGRADES	$1,200,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE JET/VAC TRUCK	$235,000.00
CONTINGENCY / INFLATION COSTS - 12%	$225,840.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$379,411.20
ESTIMATED CAPITAL IMPROVEMENTS 2020	$2,487,251.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2020	*$813,664.60*
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2020	**$3,300,915.80**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 5 - 2021	
MORRISTOWN PS - ROOF & LINTEL REPLACEMENT	$20,000.00
MORRISTOWN PS - 3 PUMP MOTOR REPLACEMENTS	$35,000.00
MORRISTOWN PS - CHECK VALVE & GATE VALVES	$25,000.00
NEW VERNON PS - ROOF REPLACEMENT	$10,000.00
SKYLINE DRIVE PS - PUMP REPLACEMENTS	$60,000.00
SKYLINE DRIVE PS - CHECK VALVES & GATE VALVES	$25,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
WWTP - OXIDATION DITCH 1 - EMPTY, CLEAN REPAIR	$15,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - FUEL BLDG - REPLACE FUEL PUMPS	$25,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE F-350 UTILITY	$50,000.00
CONTINGENCY / INFLATION COSTS - 12%	$47,040.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$79,027.20
ESTIMATED CAPITAL IMPROVEMENTS 2021	$518,067.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2021	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2021	**$1,331,731.80**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 6 - 2022	
MORRISTOWN PS - GRINDER INSTALLATION	$80,000.00
MORRISTOWN PS - FLOW METER REPLACEMENT	$15,000.00
NEW VERNON PS - PUMP REPLACEMENTS	$50,000.00
NEW VERNON PS - CHECK VALVE & GATE VALVES	$30,000.00
CLOVER HILL PS - PAVE ACCESS ROAD	$12,000.00
CLOVER HILL PS - NEW EXPLOSION PROOF LIGHTING	$60,000.00
WWTP - 4 RAS PUMP REPLACEMENTS	$90,000.00
WWTP - DIGESTER BLDG - REPLACE BLOWERS	$80,000.00
WWTP - DIGESTER BLDG - EMPTY, CLEAN PAINT TANK INTERIORS	$45,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE F-250 PICKUP	$40,000.00
CONTINGENCY / INFLATION COSTS - 12%	$70,080.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$117,734.40
ESTIMATED CAPITAL IMPROVEMENTS 2022	$771,814.40
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2022	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2022	**$1,585,479.00**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 7 - 2023	
WWTP - GENERATOR REPLACEMENT	$100,000.00
CLOVER HILL PS - CHECK VALVES & GATE VALVES	$60,000.00
CLOVER HILL PS - 2 -20 HP PUMP REPLACEMENTS	$75,000.00
CLOVER HILL PS - ROOF SYSTEM, GUTTERS, SOFFITS	$25,000.00
SKYLINE DRIVE PS - PAVE ACCESS ROAD	$15,000.00
NEW VERNON PS - DOOR REPLACEMENTS	$10,000.00
NEW VERNON PS - GRINDER INSTALLATION	$80,000.00
NEW VERNON PS - ACCESS DRIVE PAVING	$15,000.00
MORRISTOWN PS - BY PASS PUMP, CLEAN AND PAINT WET WELL INCLUDING REPAIRS	$20,000.00
WWTP - REPLACEMENT LIME MIXERS & PUMPS	$45,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
WWTP - WAS PUMP 1 & 2 REPLACEMENT	$85,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - UV LAMP REPLACEMENT	$20,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$81,240.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$136,483.20
ESTIMATED CAPITAL IMPROVEMENTS 2023	$894,723.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2023	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2023	**$1,708,387.80**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 8- 2023	
MORRISTOWN PS - GENERATOR & TRANSFER SWITCH REPLACEMENT	$85,000.00
MORRISTOWN PS - ELECTRICAL UPGRADES	$25,000.00
MORRISTOWN PS - LIGHTING UPGRADES	$20,000.00
MORRISTOWN PS - VENTILATION / HEATING UPGRADES	$30,000.00
NEW VERNON PS - SPIRAL STAIR REPAIRS	$5,000.00
CLOVER HILL PS - GRINDER INSTALLATION	$90,000.00
CLOVER HILL PS - FLOW METER	$15,000.00
UNION PS - FLOW METER	$15,000.00
WWTP - OXIDATION DITCH 2 - EMPTY, CLEAN, REPAIR	$20,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$48,240.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$81,043.20
ESTIMATED CAPITAL IMPROVEMENTS 2024	$531,283.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2024	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2024	**$1,344,947.80**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 9- 2025	
NEW VERNON PS - GENERATOR REPLACEMENT	$80,000.00
NEW VERNON PS - ELECTRICAL IMPROVEMENTS	$25,000.00
NEW VERNON PS - VENTILATION IMPROVEMENTS	$30,000.00
CLOVER HILL PS - GENERATOR & TRANSFER SWITCH	$80,000.00
CLOVER HILL PS - NEW VENTILATION SYSTEM	$40,000.00
CLOVER HILL PS - NEW HEATER	$35,000.00
CLOVER HILL PS - NEW ELECTRICAL SERVICE & PANEL	$50,000.00
HERITAGE PS - 2-7.5 HP PUMPS	$40,000.00
HERITAGE PS - CHECK VALVES & GATE VALVES	$20,000.00
WWTP - MAIN BUILDING - BOILER REPLACEMENT	$65,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - POST AERATION - BLOWER REPLACEMENT	$75,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$80,040.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$134,467.20
ESTIMATED CAPITAL IMPROVEMENTS 2025	$881,507.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2025	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2025	**$1,695,171.80**

MAJOR CAPITAL IMPROVEMENTS & WATER DISTRIBUTION PROJECTS	ESTIMATED COSTS
YEAR 10- 2026	
MT VERNON - FLOW METER REPLACEMENT	$15,000.00
SKYLINE DRIVE PS - FLOW METER REPLACEMENT	$15,000.00
CLOVER HILL PS - I BEAM AND HOIST REPLACEMENT	$15,000.00
CLOVER HILL PS - POTABLE WELL PUMP	$15,000.00
HERITAGE PS - GRINDER INSTALLATION	$65,000.00
WWTP - DISTRIUBTION BOX 1 - REPLACE SLUICE GATE	$25,000.00
WWTP - OXIDATION DITCH 1 - EMPTY, CLEAN REPAIR	$15,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - REPLACE MISCELANEOUS SAND FILTER	$100,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$43,440.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$72,979.20
ESTIMATED CAPITAL IMPROVEMENTS 2026	$478,419.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2026	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2026	**$1,292,083.80**

YEAR 11 - 2027	
VALLEY ROAD PS - FLOW METER	$15,000.00
HERITAGE ROAD PS - ROOF REPLACEMENT	$8,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
OXIDATION DITCH 1 - REPLACE MOTORS & VFD ADD	$100,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$30,000.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$50,400.00
ESTIMATED CAPITAL IMPROVEMENTS 2027	$330,400.00
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2027	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2027	**$1,144,064.60**

YEAR 12- 2028	
WARREN PS - 2-7 HP PUMP REPLACEMENTS	$40,000.00
WARREN PS - CHECK VALVES & GATE VALVES	$20,000.00
WWTP -CLARIFIER 1 & 2 - HALF ARM & MOTOR REPLACEMENT	$85,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE 2500 PICKUP	$30,000.00
CONTINGENCY / INFLATION COSTS - 12%	$32,640.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$54,835.20
ESTIMATED CAPITAL IMPROVEMENTS 2028	$359,475.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2028	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2028	**$1,173,139.80**

YEAR 13 - 2029	
MORRISTOWN PS - GRINDER TEETH REPLACEMENTS & REPAIRS	$10,000.00
SKYLINE DRIVE PS - GENERATOR REPLACEMENT	$65,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
WWTP - OXIDATION DITCH 2 - EMPTY, CLEAN, REPAIR	$20,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - SAND FILTER BUILDING ROOF	$15,000.00
WWTP - DIGESTER BLDG - 2 SLUDGE THICKENING PUMPS	$30,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE F-250 TRUCK	$40,000.00
CONTINGENCY / INFLATION COSTS - 12%	$36,840.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$61,891.20
9ESTIMATED CAPITAL IMPROVEMENTS 2029	$405,731.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2029	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2029	**$1,219,395.80**

YEAR 14 - 2030	
VALLEY ROAD PS - TWO 7.5 HP SUBERSIBLE PUMPS	$30,000.00
KING DRIVE PS - TWO 3 HP SUBMERSIBLE PUMPS	$20,000.00
WWTP - SAND FILTER BUILDING - BOILER REPLACE	$65,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE F-350 UTILITY	$50,000.00
CONTINGENCY / INFLATION COSTS - 12%	$29,640.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$49,795.20
ESTIMATED CAPITAL IMPROVEMENTS 2030	$326,435.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2030	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2030	**$1,140,099.80**

YEAR 15 - 2031	
KING DRIVE PS - GENERATOR REPLACEMENT	$60,000.00
NEW VERNON PS - POTABLE WELL PUMP REPLACEMENT	$8,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE F-250 PICKUP	$40,000.00
CONTINGENCY / INFLATION COSTS - 12%	$26,400.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$44,352.00
ESTIMATED CAPITAL IMPROVEMENTS 2031	$290,752.00
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2031	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2031	**$1,104,416.60**

YEAR 16 - 2032	
VALLEY ROAD PS - GENERATOR REPLACEMENT	$60,000.00
MORRISTOWN PS - FLOW METER REPLACEMENT	$15,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - DIGESTER BLDG - EMPTY, CLEAN PAINT TANK INTERIORS	$45,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$18,840.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$31,651.20
ESTIMATED CAPITAL IMPROVEMENTS 2032	$207,491.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2032	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2032	**$1,021,155.80**

YEAR 17 - 2033	
NEW VERNON PS - GRINDER MAINTENANCE / TEETH REPLACEMENT	$15,000.00
SKYLINE DRIVE PS - PUMP REPLACEMENTS	$60,000.00
HERITAGE ROAD - GENERATOR REPLACEMENT	$65,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
WWTP - REPLACEMENT ROTARY DRUM SCREENS	$200,000.00
WWTP - OXIDATION DITCH 1 - EMPTY, CLEAN REPAIR	$15,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
REPLACE JET/VAC TRUCK	$230,000.00
CONTINGENCY / INFLATION COSTS - 12%	$85,440.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$143,539.20
ESTIMATED CAPITAL IMPROVEMENTS 2033	$940,979.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2033	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2033	**$1,754,643.80**

YEAR 18 - 2034	
CLOVER HILL PS - 2 -20 HP PUMP REPLACEMENTS	$75,000.00
WWTP - LIME MIXING TANKS / MIXERS	$80,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$30,240.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$50,803.20
ESTIMATED CAPITAL IMPROVEMENTS 2034	$333,043.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2034	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2034	**$1,146,707.80**

YEAR 19 - 2035	
UNION PS - GENERATOR REPLACEMENT	$80,000.00
WWTP - LIME TRANFER PUMPS	$30,000.00
WWTP - OXIDATION DITCH 2 - EMPTY, CLEAN, REPAIR	$20,000.00
WWTP - UV LAMP REPLACEMENT	$20,000.00
WWTP - FUEL BLDG - REPLACE FUEL PUMPS	$25,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$30,840.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$51,811.20
ESTIMATED CAPITAL IMPROVEMENTS 2035	$339,651.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2035	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2035	**$1,153,315.80**

YEAR 20 - 2036	
MT VERNON PS - FLOW METER REPLACEMENT	$15,000.00
CLOVER HILL PS - FLOW METER	$15,000.00
HERITAGE PS - 2-7.5 HP PUMPS	$40,000.00
WWTP - ONE INFLUENT PUMP REPLACEMENT	$30,000.00
WWTP - 4 RAS PUMP REPLACEMENTS	$90,000.00
WWTP - WAS PUMP 1 & 2 REPLACEMENT	$85,000.00
WWTP - REPLACE 2 AIR LIFTS	$15,000.00
WWTP - POST AERATION - BLOWER REPLACEMENT	$75,000.00
WWTP - PHOSPHORUS CHEMICALS	$82,000.00
CONTINGENCY / INFLATION COSTS - 12%	$53,640.00
ESTIMATED ENGINEERING, PERMITTING, INSPECTION & CONTRACT ADMINISTRATION	$90,115.20
ESTIMATED CAPITAL IMPROVEMENTS 2036	$590,755.20
EST. ANNUAL SANITARY COLLECTION SYSTEM IMPROVEMENTS - 2036	$813,664.60
TOTAL ESTIMATED UTILITY IMPROVEMENT COSTS - 2036	**$1,404,419.80**

Appendix B

Proposed 20-Year Sanitary Conveyance System Improvements Plan (2017-2036)

APPENDIX B

PROPOSED 20 YEAR SANITARY CONVEYANCE SYSTEM IMPROVEMENT PLAN (2017 - 2036)

GENERAL SANITARY MAIN IMPROVEMENTS - 25% OF MAINS REPLACED/LINED OVER 20 YEARS	ESTIMATED COSTS
8" SANITARY MAIN REPLACEMENTS/LINING - ESTIMATED 71,575 LF	$12,525,625.00
CONTINGENCY / INFLATION COSTS - 12%	$1,503,075.00
TOTAL ESTIMATED CONSTRUCTION COSTS	**$14,028,700.00**
ESTIMATED ENGINEERING, INSPECTION & CONTRACT ADMINISTRATION	$2,244,592.00
ESTIMATED ANNUAL SANITARY CONVEYANCE SYSTEM PLANNING COSTS - 20 YEAR PERIOD	**$813,664.60**

Appendix C
Wastewater Department – Existing Vehicle Inventory

Existing Vehicle Inventory

Department	Designation	Year	Make	Model	Cost New
Sewer	#S-1	2014	Ford	F-250 Pickup	$36,167.00
Sewer	#S-2	2009	Ford	F-350 Utility	$44,816.00
Sewer/Shared		2006	Ford	F-250 Van	?
Sewer	#S-3	2003	GMC	2500 Pickup	$27,303.00
Sewer/Shared		2002	International	Jet/Vac Truck	$226,454.00